RAILROAD GAZETTE

FRIDAY, FEBRUARY 18, 1881.

Contributions.

What the Road Might Do for Its Men.

TO THE EDITOR OF THE RAILROAD GAZETTE :

There is no class of men in any department of civilized life who need more care than the workingmen of a railroad. It is on their efficiency as *men* that the safety of travel depends; break them down physically, mentally or morally, and an increased percentage of danger begins to operate. There are roads which are over-working their men; good luck may seem to rule for a time, but the unstrung nerves of a weary engine-driver are sure to tell on the percentage of accidents. Economy is nowhere more out of place than in demanding more than fairly easy work of such men. However perfect the system of a road, there is no safety in any check which must be operated by physically disabled men. A railroad manager needs to know many things, and not least among them should stand some knowledge of the physical structure, out-go and stamina of the human nervous system.

But aside from any abuse of the men, there is a positive care over them which it is possible to exercise, and which cannot fail to work for the permanent benefit of safe travel and economical operating.

1st. It is possible (and this is in every way for the men's interest) to demand a high standard of knowledge and practical ability for any position of importance. It is an injury to the road, to public safety and to the men, to appoint ignorant runners, or even ignorant firemen—even a brakeman has his right to be protected against stupidly wrecking a hundred lives of his fellow men by being allowed to accept a responsibility for which he had neither the quickness nor intelligence. Are not railroad officers too apt to rely on mere system? Undoubtedly there is a temptation to economize by transferring an efficient and nicely working method of operating into cheaper hands; and it cannot be too strongly insisted on, that in railroad matters mere financial competition has no place except as growing out of a large and long experience.

It would, in every way, be a positive gain did every superintendent demand a fairly high standard of knowledge of every road-man holding a position. There is some difficulty, no doubt, in determining how much a standard should be applied. There are not a few ignorant men who, when brought to the face of their work, wake up into an alert, practical ability, which there is no other way of discovering in them. Nevertheless, it remains true that in this country, in the year 1881, there is a strong presumption against an engine driver, let us say, who has not had the requisite education to comprehend and acquire a knowledge of the *theory* of the locomotive. And if such men have the ability and requisite foundation for such knowledge, it remains only with the road to say whether or not they shall have it. When men know they are to be tested, they will prepare themselves.

On the other hand, there would be danger (it probably does not now anywhere exist) in any sort of system which should test the knowledge of candidates and leave their skill untried. Here, we believe, and not simply in the wages question, lies the difficulty of raising the standard of mental ability. These two sides of the human mind, the intellectual, or power of conscious understanding, and the practical, or power of unconscious skill, of ability to do when brought under the stimulus of some thing to be *done*—these two powers are not only distinct, but seem frequently to exist in individuals, one to the exclusion of the other.

Nevertheless, everywhere, wherever practical ability has always been most in demand, there is a call on men, and a response from them, for more intellectual power and a wider conscious knowledge about their craft and profession.

It would not be too much to ask of every promoted fireman that he should pass a *good* examination on the theory and construction of the complicated machine which he is to run, as no other machine (except its companion, the steamer) is run by any other class of man for the weal or the woe of many human lives.

Systems of Signals and Interlocking Apparatus in France.

[Summarized from the *Annales des Ponts et Chaussées.*]

The Central Administration of the railroad department of the French Ministry of Public Works, recently asked the opinion of its Technical Commission on Operating concerning the signals in use on the French railroads, in the following memorandum :

"The attention of the Central Office is called to the question of the adoption by the various companies of a uniform system of signals to protect traffic at junctions.

"The plan adopted on the Northern Railroad system, in which the absolute stop signal gives 'way clear' only while the lever is held by the junction switchman, has undoubted advantages provided it is certain that two ways are not open at once.

"Another system (Saxby & Farmer's) which secures by interlocking, complete harmony between the switches and the junction signals, is in use on the Mediterranean system. It makes impossible any collision at the point of danger *if the enginemen obey the signals.*

"The Central Office, before advising the companies, wishes the opinion of the Technical Commission on Operating concerning the merits of the various apparatus used at junctions. * * * The Commission is requested to give its opinion on the two following questions :

"1. Is it desirable to indicate to the companies the opportunity to make uniform the systems of junction signals ?

"2. If so, which is the system to recommend to the companies as giving the best guarantee of public safety ?"

In consequence of these inquiries a sub-commission of the Technical Commission was appointed, consisting of MM. Luuyt, mining engineer, president; Marie, Chief Engineer of Rolling Stock and Motive Power of the Paris, Lyons & Mediterranean Railroad; and Heurteau, Mining Engineer and Assistant Superintendent of Operation of the Orleans Railroad, reporter. The report of this sub-commission, from the pen of M. Heurteau, is published in the *Annales des Ponts et Chaussées* for November, 1880, and is summarized below :

The regulations of junction signals in force on the different systems may be divided into two classes, according to the use made of interlocking devices, and to the part which they play.

The Northern, the Eastern, the Orleans and the Southern companies apply the same rules to their junctions whether they are or are not provided with interlocking apparatus. The signals are arranged and the orders of the attendant are formulated so as to insure safety independently of all interlocking apparatus. This apparatus is looked upon merely as a safe-guard against negligence or error. The Eastern Company, on the contrary, having established interlocking apparatus at all of its junctions, has arranged its signals and made its rules with reference to the security that interlocking gives, and has thereby simplified the organization of its service. The Paris, Lyons & Mediterranean Company, which is making a general application of the interlocking system to its junctions, follows the example of the Western Company in the modification of its rules.

Rules of the first class, those which seek security without interlocking the switches and signals, rest upon one principle, viz., the absolute interdiction of the passage of two trains at once over the lines of a junction. It is evident that the observance of this rule assures complete safety from collision; but at a double-line junction it unnecessarily delays traffic.

The rules for junction signalmen of the Western Company, and the new rules of the Lyons Company, taking advantage of the interlocking apparatus, permit the simultaneous passage of trains over such tracks at double junctions as do not necessarily conflict.

A second principle is common to the rules for junction signals on all the lines but the Western. It is to keep constantly covered all three of the lines which converge to any double junction by signals, which stand normally at full-stop, and which must be cleared only one at a time, and in accordance with the orders of the switchman. The Western Company, on the contrary, designates one line as the principal line, which is normally open and the others are closed by the normal position of the signals.

The rules for junction signals of the Southern, the Northern, the Eastern and the Orleans companies are but applications of the above principles—absolute interdiction of the opening of the ways to two trains at once; constant closing of the three line converging on a junction by signals normally at stop.

There are certain differences of detail which it may be instructive to consider.

1. *The Northern System.*—Each of the three lines converging upon a double junction is protected by three signals: a fixed green signal (junction indicator) at 800 meters (2,465 ft.) from the point of switch; a square stop-signal, with a torpedo attached, at 60 metres (185 ft.) from the switch point; a distant signal to cover a train stopped at the junction, besides which there is a switch target. The stop signal is normally at stop; the distant signal is normally at clear. When the engineman passes the green signal he begins to reduce speed so as to be able to stop at the stop signal, should that be against him. Should he receive a clear signal, he passes the junction without stopping, but at reduced speed, 20 kilometers an hour (12.4 miles) for passenger trains, and 10 kilometers an hour (6 2 miles) for freight. Two posts are set, one near the stop signal, another 100 meters beyond, and the distance between them should not be traversed in less than 18 seconds for passenger trains, or 36 seconds for freight trains. As was said, the stop signal is nominally at stop, and it returns to that position the instant the signalman quits the lever by which it is operated; thus it becomes difficult for him to give "way clear" on two lines at once.

2. *Eastern System.*—These signals are like those of the Northern system, except that there is no green signal (junction indicator). On these lines the distant signals, as well as the stop signals, stand normally at stop. When an approaching train whistles for the junction, if the way is clear the signalman must clear the distant signal and close it at once behind the train, and the train must come to a full stop at the junction before passing the stop signal, which the signalman only clears after the train has stopped.

3. *Paris, Lyons & Mediterranean System.*—As some of the junctions of these lines are provided with interlocking apparatus, and others are not, their junction signals differ. The Saxby & Farmer system will, however, ultimately be applied to all the lines. The junctions unprovided with interlocking are protected by a semaphore on each of the three lines converging. Before each semaphore, at 1,200 meters (3,694 ft.) from the switch point, is placed a fixed warning signal, lighted at night, on which is the word "*bifurcation.*" A post bearing the word "*arrêt*" (stop), lighted at night, is placed at 100 meters (308 ft.) before the semaphore. This is not to be passed if the semaphore stands at stop. Distant signals are so placed as to cover trains arrested at the junction. On passing the warning signal, speed is so reduced that the train can be stopped if the semaphore is found at stop. Should this be clear, the train goes on, but the speed at passing the junction must not exceed the pace of a man walking. For junctions provided with interlocking the signals are somewhat more complex. Each branch is protected by an absolute stop signal, normally at stop, 100 meters (308 ft.) before the switch; by a distance signal, also normally closed, and by a fixed warning signal, with the word "*bifurcation,*" lighted at night and placed near a watch-box. The watchman here announces to the junction switchman, by electric signals, the approach of a train and its destination. A semaphore placed near the switch performs the office of a switch target. All the signals are normally closed. When a train is announced, the junction switchman prepares the way and the signals, and if the signals are clear the train passes at reduced speed—20 kilometers an hour (12.4 miles). If the engineman finds the distance signal closed, he reduces speed to a foot-pace and goes on cautiously.

4. *Orleans Railroad System.*—On these lines the distance signals are absolute stop signals, and are provided with torpedoes. A fixed warning signal is placed 500 meters (1,539 ft.) before this, and near the junction is a signal operated by the movement of the switch. The signals are normally at stop. If the approaching engineman finds the signals clear, he passes at half-speed—in no case faster than 25 kilometers (15.5 miles) an hour. If the signals are closed, he stops at the distance signal, and the train is protected from a following train by a man sent out 800 meters (2,463 ft.) to the rear, or by a special signal worked by a lever at the distance signal, and which the conductor of the train operates.

5. *Southern Railroad System.*—Here the junctions are protected simply by distant signals, standing normally closed. If the engineman finds the signal against him, he goes on at a foot-pace, sending out a flagman ahead. Thus he proceeds to the junction, which he can only pass on reception of a signal from a green hand-flag, given by the switchman. If the signal is found clear a main-line train passes the junction without stopping—simply slowing; a branch train comes to a full stop before crossing.

6. *Western Railroad System.*—Here, at each junction, the main line is normally open, and its trains pass freely, while the branch line is normally closed; furthermore, all the junctions of this system have interlocking apparatus, which admit of the simultaneous passage of trains over the lines. Each junction has a special disposition of signals and scheme of interlocking, suited to its traffic.

[For examples of such schemes see the *Railroad Gazette* of Oct. 16, 1875.]

It will be seen that there are important differences in the signals and in the regulations for junctions on the various railroad systems. The problem is to insure the safety of the movement of trains at these dangerous points, without impeding unnecessarily the traffic, and without overtaxing the operating service. In such a case it is difficult to fix absolute rules; and it is proper to respect the opinions of the engineers who are responsible for the safety of operating. Within each system the organization and regulations of the junction signals are uniform; that is a great point. Is it possible to extend this uniformity throughout the French system? In theory that is desirable; but it seems difficult to realize in practice. It should not be done by orders from the central administration. It would be unwise to remove the direct responsibility from the local officials. Without the intervention of the central administration, uniformity might be established by an agreement among all the companies; but not to speak of the expense of changing signals now established, it would be a peculiarly difficult undertaking, and one of considerable danger, to educate anew the staff of the various lines. Moreover, each of the methods of the companies for securing safe working of traffic through junctions is adequate *if the signals are obeyed, and if the switchmen obey their orders.* The latter cause of danger may be completely eliminated by interlocking apparatus.

The sub-committee made, what they call a comparative study of interlocking apparatus and of their mechanical properties and mode of application; but their researches were confined, evidently, to the Vignier apparatus and to that of Saxby & Farmer; probably for the reason that only these two systems could easily be seen by them in actual operation.

Concerning the objects which can be accomplished by the interlocking of switches and signals, and the mechanism by which the interlocking is done, this report tells nothing which has not been more fully told at various times in the *Railroad Gazette.*

Several pages of the report are given up to a refined and elaborate analysis of the method to be pursued in making a scheme of interlocking for any given set of levers. This is a fruitless study in the abstract, but the general principles arrived at by the sub-committee would be of interest to one having to do with actual applications of the system.

Twenty-five years ago, the Western Railway Company first applied the apparatus invented by M. Vignier, and it is now employed at many points on its lines, especially at all their junctions. The Northern, the Southern, and the Paris, Lyons & Mediterranean companies have also made many useful applications of the Vignier system. The principle of this apparatus consists in attaching the levers to be interlocked to two sets of metallic rods, which move longitudinally in directions perpendicular to each other, the rods of one set having holes,

which are entered by the rods of the other set acting as bolts.

The apparatus of Saxby & Farmer (for detailed descriptions see the *Railroad Gazette*, Oct. 13 and 20, 1876,) has been adopted by the Lyons, the Orleans, the Northern and the Eastern companies, and is now in use upon the Lyons system at Ville-neuve-Saint-Georges, at Nimes, at Moret, at the Lyons-Guillotière Station, upon the Orleans Railroad, at the Paris Station, and at the junction of Brittégny; upon the Northern Railroad, at Amiens, and at Boulogne; upon the Eastern Railroad, at the Gretz and the Chalindrey junctions. New applications of this apparatus are now in preparation.

The practical outcome of the investigations of the sub-committee is:

As regards interlocking apparatus, the use of this system enables traffic to be moved through junctions at high speeds and permits the full use of the double tracks; and (by use of the facing-point lock) makes it safe to run at speed against switch points. The companies understand the uses and value of the interlocking system, and are extending its application. The Vignier system is simple and inexpensive for apparatus of very few levers. For complicated positions, involving many levers, the Saxby & Farmer is not only better than the Vignier, but is the highest type of interlocking apparatus known.

As regards administrative action on the question of making signals uniform throughout the French systems, the committee does not advise it, because of the expense, the danger, the transfer of responsibility from local officers to the central service, and from reluctance to paralyze liberty of action in the companies, and thus close the door to future progress.

Ashton's Blow-back Noiseless Safety Valve.

The process by which a machine or invention is perfected is nearly always one of gradual evolution. This, as Herbert Spencer expresses it, "consists in a change from the homogeneous to the heterogeneous. In the development of manufactures, science and art, this same advance from the simple to the complex, through successive differentations, holds uniformly." The operation of this law has been illustrated in the way in which the safety-valve, which is the subject of this article, has been perfected.

Twenty-five years ago, a safety-valve was a very simple contrivance, and the theory of it equally so. The former consisted of a round opening in a boiler with a cover which was loaded so as to require any desired pressure per square inch in the opening to lift it. It was expected that when the pressure reached this point, the valve would open, and that when enough steam had escaped to lower the pressure below the limit fixed, it would close. All this appeared very simple, but to show how very difficult it was to attain in practice what was assumed in theory, the following record of experiments, made with different safety-valves by a commission appointed by Congress to examine life-saving inventions, in 1868, will show. The valves were tested by attaching them to a steam boiler and observing their action:

Set to open at	Blew off at	Closed at
107	115	106
107	171	114
53	59	58
53	60	57
40	58	52
45	49	24
45	46	35
45	45	35
42	50	50
82	61	89
82	91	89
35	45	35
90	93	74
90	90	85
50	50	45
50	50	46
50	50	40
50	60	50
42	45	38
103	106	92
103	106	97
75	80	74
75	80	73
100	99	85
100	98	95
130	133	114
130	136	115
1 5	137	121
136	137	138
136	136	137
30	31	30
30	31	30½

This report shows that there was as much as 18 lbs. difference in the pressure at which some of these valves were set to open and that at which they actually did open, and that there was as much as 25 lbs. difference in the pressure at which some of them opened and that at which they closed.

Still another difficulty exists. It might be supposed that if a boiler was generating steam rapidly, as the pressure rose the valve would be lifted from its seat somewhat in proportion to the increase in pressure. In practice, however, it is found that with ordinary safety-valves the pressure in the boiler will often exceed, very considerably, that at which the valve begins to blow off without lifting the latter sufficiently to allow the steam to escape rapidly enough to keep the pressure down to the limit.

Still another evil which has been and is the cause of much annoyance and the subject of great complaint is the disagreeable noise produced by the escaping steam. The object of the invention which we are about to describe was originally to remedy the evil last referred to; but as it has been perfected, the inventor has aimed further to make a valve which will open promptly when the limit of pressure is reached and will then give a sufficient aperture to permit the steam to escape, so that that pressure will not be exceeded, and which will close promptly when the pressure is reduced below the point at which the valve opens.

The first step which was taken to accomplish those objects is embodied in a patent granted to Mr. Peter C. Wortman, of Meadville, Pa., in 1869, for "feed water heaters," and the invention was intended to use the waste stream which

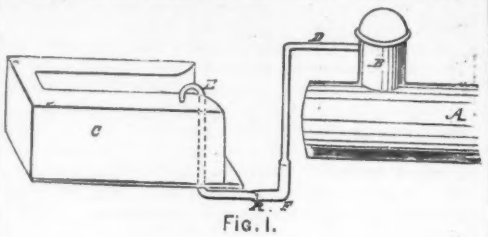


Fig. 1.

escapes from the safety-valves for heating the water in the tank. Fig. 1 is a copy of the drawing accompanying the patent, and is described as follows in the specification:

"*A* represents a locomotive boiler; *B*, the drum of the

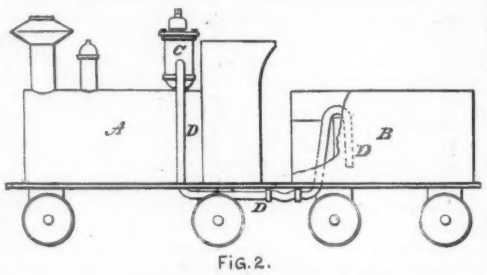


Fig. 2.

same; *C*, the water-tank in the tender. *D E* is a tube or pipe, with a flexible joint of rubber at *F*.

"This pipe empties into the water *C* at *E*, and through

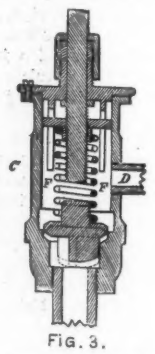


Fig. 3.

this pipe the waste-steam passes into the water-tank *C*, heating the water."

The claim is as follows:

"The combination of the pipes *D* and *E*, with the dome *B* and the tank *C*, constructed as described and set forth."

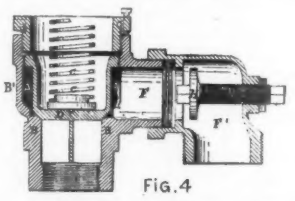


Fig. 4

This apparently slumbered until 1877, when Mr. Henry G. Ashton, of Boston, took out a patent for an "improvement in safety-valve attachments to utilize the escape

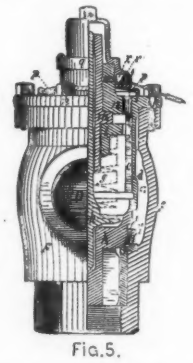


Fig. 5.

steam." Figs. 2 and 3 are copies of the drawings appended to his patents. His invention, he says,

"Consists in conducting the steam which escapes from the

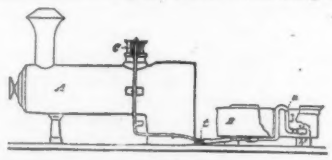


Fig. 6

safety-valve or valves to the tank which contains the feed-water, thereby preventing all visible escape of the steam, all noise attending such escape, and utilizing a very large percentage of such steam by causing it to heat the feed-water.

"In the drawing, fig. 2, *A* indicates a locomotive, *B* its tender, *C* one of its safety-valves and *D* a pipe connecting the valve-casing with the feed water tank in the tender."

Fig. 3 represents a section of the valve used.

"Its casing is closed sufficiently to compel the steam which escapes through the valve proper to pass through the pipe, *D*, into the feed-water. To this end the valve-stem should be properly packed, as shown in the drawings."

The claim is as follows:

"The combination of the safety-valve and feed-water tank, as described, in order that the steam which escapes through the valve shall be conducted into the feed-water, as and for the purposes specified."

This patent, it will be seen, is substantially the same as Wortman's. From fig. 3 it is evident, though, that the steam which escapes into the chamber *F* when the valve opens will produce more or less pressure above the valve, and will thus prevent it from rising from its seat and thus relieving the pressure below it as much as it would if the space above the valve were open to the atmospheric air. It was for this reason probably that later in 1877 Mr. Ashton and James E. Maynadier took out another patent for improvements in safety-valves, which are represented by fig. 4. In this

"The valve is open to the atmosphere on its outer surface, and the waste steam does not ascend past the edges of the valve, but is discharged by means of a pipe, *F*, which leads from a chamber, *A*, of which the valve forms a part. * * * *D* is the valve proper, ground upon its seat in the usual way. *B* is the seat or bushing, which is secured to the boiler or other reservoir of power in the usual way; and *C'* represents the spring or means of keeping the valve upon its seat until the pressure in the boiler exceeds the desired amount. Around the seat a chamber, *A*, is formed by the parts *B* of the casing forming the bottom of this chamber, the part *B'* of the casing forming its sides, and the valve *D* completing this chamber, so that the steam which passes the seat of the valve enters this chamber, and cannot escape from it except by an outlet pipe, *F*, which leads from the chamber *A* to any desired point."

The principal claim of this patent is the following:

"We claim in combination with the seat *B*, casing *B'*, and outlet-pipe *F F'*, a safety-valve, *D*, fitted so closely as to prevent any considerable part of the waste steam escaping past the periphery of the valve *D*, and to compel substantially the whole of the waste steam to pass through the outlet-pipe *F F'*, and open to the atmospheric pressure on its outer surface."

On the same date as the patent last referred to Mr. Ashton took out another patent, the main object of which, he says, in his specification, "is to get rid of the back pressure on the valve, due to the confining of the steam in the pipe which leads to the feed-water in the tender or tank, and in the chamber from which it leads, and also keep this pipe free from water." The improved valve which is the subject of this patent is represented by fig. 5, and is described as follows in the specifications of the patent:

"The casing, is partitioned into two chambers, one of which, *c*, is open to the air, and in which the upper part of the valve fits, but not closely enough to retard its upward movement materially; and into the other, *a*, the forward end of the pipe *d* opens, the other end of which opens into the feed-water tank.

"It is obvious that if steam at, say, 120 lbs. pressure to the square inch, escaped passed the valve, it would fill the whole of the casing *g*, if it were not for the partition-cylinder *d*, which separates the interior of this casing into two chambers, *a* and *c*, and that its pressure in the single chamber would tend to aid the spans *g* in closing the valve. This pressure, unless counteracted in some way, is sufficient to make the apparatus practically inoperative. To counteract this back pressure, the pipe *D*, which conveys the steam from the valve to the tank, is connected at its forward end with the chamber *a*, which is partitioned off from the chamber *c*, in which the valve rises, and in this way the valve is relieved from the back pressure.

"In fig. 5 the valve is marked *h*, and its bushing or seat *j*. Its spindle, *k*, supports one end of the spring *g*, the other end of which is pressed upon by the nut *l*, which is controlled by the screw *m*, a shoulder on which bears against the under side of the cover *n*. The load of the valve in increased by turning the screw *m*, and thereby forcing the nut *l* nearer to the valve and shortening the spring *g*. The stress of this spring is exerted upon the valve through the spindle *k*.

"The cover *n* is firmly secured to the casing *f*, and it is preferred to form the cylinder *d* in one piece with the cover *f*, so that when the cover is put in place the cylinder *d* will be in the right relation to the valve."

Holes are made in the cover *n* to give a free outlet to the air from the chamber *c*, and to protect these holes from cinders and dirt they are protected by a perforated cover *p*.

Fig. 6 represents other features which are the subject of this patent. In this figure

"*A* represents a locomotive boiler; *B*, its tender; *C*, a safety-valve, and *D*, the pipe through which the escape steam from the safety valve passes into the feed-water in the tender. This part of the invention relates to the use of small apertures in the pipe *D*, one of them, *t*, at the lowest point of the pipe, and the other, *u*, above and nearer the surface of the water, for the purpose of keeping the pipe *D* free from water.

"When the steam in the pipe *P* condenses, the water of condensation collects, of course, at the lowest part of the pipe, and escapes through the aperture *t*. The condensing of the steam also causes a partial vacuum in the pipe *D*, and the air rushes from chamber *C* between valve *h* and cylinder *d* into chamber *a* and into the upper part of pipe *D*; but inasmuch as the water in the tender is often only a few inches below the bend of the pipe *D*, the partial vacuum in pipe *D* will frequently be great enough to cause the water in the tender to flow over this bend before air enough can enter the pipe *D* through the channel above described, and it is for this reason that I use the aperture *u*, which can be made large enough—say one-eighth of an inch in diameter—to supply all the air required."

If the end of the pipe *D*, at *b*, where it leads into the tender is left open, the steam, when it escapes, will make a loud rumbling noise, which is so loud as to be very objectionable. To obviate this the end of the pipe *D* in the tender is closed, and it is perforated with numerous small holes, the total area of which is sufficient to allow the proper escape of the steam, which is thus distributed into a number of small streams, and thus prevents the sound referred to.

The following are the claims of this patent:

"1. The combination, with a safety-valve having a chamber, *a*, partitioned off, as described, from the top of the valve, so that the outer surface of the valve is exposed to at

Comparative Statement of Performance of Locomotives with Ordinary Safety-Valves and with Ashton's Blow-Back Noiseless Safety-Valves.

Name of Railroad:	Engine	Time of experiment	Train mileage	Tons of coal burned	Number of trains hauled	Number of cars hauled	Mileage of cars	Pounds of coal burned per train mile	Pounds of coal burned per car per mile
Locomotives with Ordinary Safety-Valves.									
Cin. Sandusky & Cleve. ...	No. 2	1 year in '78-79	16,464	381.8	123	439	56,699	46.37	13.46
" " "	" 10	"	13,841	305.4	274	727	36,222	44.13	16.86
" " "	" 13	"	21,074	328.6	136	370	51,089	31.18	12.83
" " " †	" 18	3 months in '78-79	8,349	266	61	1,514	103,939	63.93	5.7
New York & New England*	" 34	3 months in '79	11,668	264.25	.....	759	63,474	45.28	.....
" " " *	" 14	3 months in '79	5,529	113	.....	492	13,659	.....	16.5
" " " *	" 12	3 months in '79	8,051	137.5	.....	289	17,575	.....	15.63
Boston & Maine ..... ‡	N. G. Paul.	11 months in '77-'78	31,877	778.5	.....	.....	.....	50.09	.....
Cin., Hamilton & Dayton.. *	No. 6	.....	.....	.....	.....	.....	.....	.....	2.7
" " " *	" 21	.....	.....	.....	.....	.....	.....	.....	2.3
" " " *	" 30	.....	.....	.....	.....	.....	.....	.....	2.2
Phil. Wilm. & Balt. ..... *	" 47	May, '79.	.....	.....	.....	.....	.....	.....	.....
" " " *	" 44	" "	.....	.....	.....	.....	.....	.....	.....
" " " *	" 18	" "	.....	.....	.....	.....	.....	.....	.....
Bos., Revere Beach & Lynn*	3 Engines.	Jan. '79.	8,550	117	.....	1,812	.....	27.33	.....
Wabash, St. L., & Pacific ‡	No. 14	14 months '79-'80	44,630	1,395	.....	.....	.....	62.53	.....
" " " ‡	" 19	" "	41,562	1,365	.....	.....	.....	65.68	.....
" " " ‡	" 22	13 months '79-'80	37,467	1,342	.....	.....	.....	71.63	.....
" " " ‡	" 84	12 months '79-'80.	42,163	1,411	.....	.....	.....	66.72	.....
Locomotives with Ashton's Safety-Valves.									
	No. 2	1 year in '79-'80	17,779	372.2	134	439	59,065	41.98	12.63
	" 10	"	13,514	268.8	268	916	43,000	39.79	12.50
	" 13	"	23,412	310	171	477	60,107	26.44	10.32
	" 18	3 months in '79-'80	8,120	292	68	1,665	131,225	71.98	4 99
	" 34	3 months in 1880	10,707	197	.....	871	71.811	36.76	.....
	" 14	3 months in 1880	7,172	152.25	.....	927	22,777	.....	13.8
	" 12	3 months in 1880	11,328	187.75	.....	558	34,510	.....	10.53
	N. G. Paul.	11 months in '78-'79	32,817	659.12	.....	.....	.....	40.18	.....
	No. 20	.....	.....	.....	.....	.....	.....	.....	1 8
	" 58	May, '79.	.....	.....	.....	.....	.....	.....	.....
	" 54	" "	.....	.....	.....	.....	.....	.....	.....
	" 73	" "	.....	.....	.....	.....	.....	.....	.....
	3 Engines.	Jan. '80.	10,720	119	.....	2,363	.....	20.33	.....
	No. 15	15 months '79-'80.	53,570	1,316	.....	.....	.....	49.13	.....

* Kind of service not known. † In freight service. ‡ In passenger service.

mospheric pressure, and with the feed-water tank of the pipe *D*, one end of the pipe opening into chamber *a*, and the other into the feed-water tank, all substantially as described.

"2. In combination with the safety-valve and the feed-water tank, the pipe *D*, having an orifice, *v*, in it near the surface of the water in the feed-tank, as shown.

"3. In combination with the safety-valve and the feed-water tank, the pipe *D*, having an orifice, *t*, in it at the lowest part of it, as shown.

"4. In combination with the feed-water tank and the safety valve, having an opening in it through which the air can enter the steam-chamber *a*, the pipe, *D*, having the two orifices *t* and *u*, one at the lowest part of the pipe and the other near the surface of the valve in the tank, whereby, when its steam in the chamber *a* and pipe *D* condenses, the air can enter the pipe *D* through the orifice *u* in one direction, and through the chamber *a* in the other direction, without preventing the water of condensation escaping from orifice *t*, all as shown.

"5. In combination with the feed-water tank and the safety valve, the pipe *D*, closed at its rear end and provided with a series of small holes, as set forth."

Feb. 12, 1878, another patent was granted to Mr. Ashton on the valve represented by fig. 5. From the latter it will be seen that "the valve *h* is provided with an annular projection, *h'*, of the form shown, the thin edge of which comes close down to the bushing or seat, *j*, when the valve is closed, thereby forming a chamber, *s*. A series of holes lead from this chamber, for the purpose now to be explained.

"When the steam in the boiler begins to exceed the desired pressure and forces the valve a little off its seat, the steam which escapes enters the chamber *s;* but as it cannot escape from that chamber except through the holes (and a small portion of it under the thin edge *h'*), it will there produce a pressure, aiding in lifting the valve, making what is well known as a 'pop-valve'—that is, a valve which rises suddenly and gives a large area for the escape of the steam, relieving the boiler speedily and effectually.

"It will be observed that as the valve rises, and as the steam consequently escapes more freely, the outlet from the chamber *s* under *h'* also enlarges, and as the valve descends this outlet decreases. Without these holes the valve shown would not close until the pressure in the boiler had fallen much below the pressure when the valve rose; but if these holes be of the proper area the valve will close when the pressure in the boiler is decreased less than two pounds to the square inch—that is, this valve will prevent the pressure exceeding the point at which the valve is set to rise more than one or two pounds, and will close when the pressure in the boiler has fallen less than two pounds below that at which the valve is set to rise. The total area of these holes must be adapted to the size of the valve, the pressure of the steam in the boiler, and the stiffness of the spring."

The main feature of this invention is the combination of what is called a "pop valve" with a hood or casing into which the valve rises and which prevents the access of the escaping steam to the outer surface of the valve. The claims are as follows:

"1. In a safety-valve, the valve *h*, having the chamber *s*, in combination with the seat *j*, cylinder *d*, and casing *f n*, arranged to operate substantially as described.

"2. In a safety valve, the valve *h*, having the perforated annular projection *h'* and chamber *s*, in combination with the seat *j*, substantially as described."

Another patent was granted April 2, 1878, to Mr. Ashton, in which he claims an arrangement of pipes and valves by which the escaping steam from the safety-valve may be discharged either into the smoke-box or into the water-tank.

May 7, 1878, the patent of Peter C. Wortman was reissued to the Ashton Valve Company, and the following claims were granted, the letters of reference thereon referring to fig. 1:

"1. The herein-described feed-water-heating apparatus, consisting of the combination of the tank *C*, pipe *E*, coupling *F*, pipe *D*, and the steam space of the boiler, substantially as and for the purpose specified.

"2. The combination of the tender-pipe *E*, leading into the water-tank, for the conveyance of steam, with the pipe *D*, leading into the dome or steam-space of the boiler, and the flexible connection or joint *F* between the tender and locomotive, substantially as and for the purpose specified."

On the same date as the preceding reissue of the patent of Mr. Ashton, granted Jan. 30, 1877, was reissued. The following is the claim of the reissue, figs. 2 and 3 being the engravings referred to in the original patent:

"The combination of pop safety-valve and feed-water tank, as described, in order that the steam which escapes through the valve shall be conducted into the feed-water, as and for the purpose specified."

The Ashton Valve Company claims that these patents cover fully the following points:

"1. A pop-valve in connection with a pipe for conveying the waste steam to the feed-water.

"2. A valve, having a cover which forms a chamber for

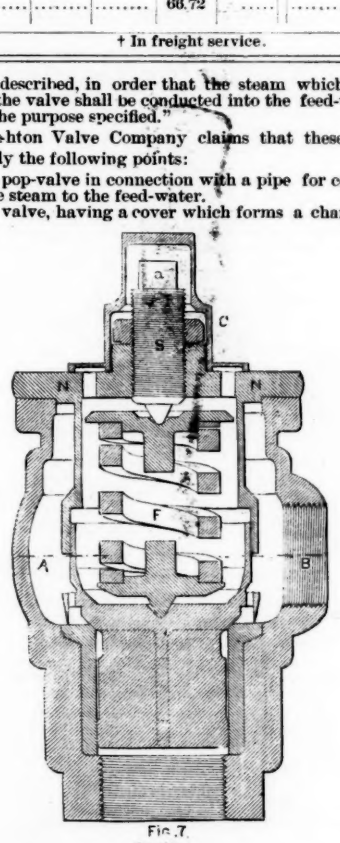
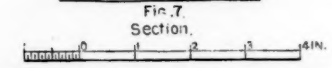


Fig. 7.
Section.



the waste steam and yet leaves the outer surface of the valve subject to not more than atmospheric pressure. This is essential in all valves with a pipe for the waste steam, whether the waste steam be carried to the feed-water, to a muffler, or to the smoke-stack.

"3. A pop-valve in connection with a chamber of the kind just mentioned."

Figs. 7, 8, 9 and 10 represent the valve as it is now used in position, and fig. 11 the manner of applying it to a locomo-

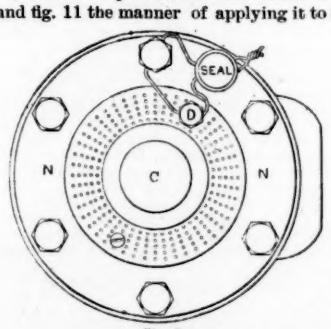


Fig. 8
Plan.

tive. In the latter figs., *V* is the valve, which is connected to the tank by a 1½-in. iron pipe.

The tender-pipe is usually run under the tender, but comes up at the back end of the coal space, and turns down through the top of tender into the water at about 3 or 4 in. from the bottom of the tank inside.

Here a short piece of pipe, say 10 in. long, as shown at *D*, running horizontally, is screwed into the elbow, having fifty ¼ in. holes in it, with a cap at the end. This holds back the steam, breaks it up and distributes it.

In the vertical or down pipe inside the tender, as close as convenient under the top plate, near the surface of the water as shown at *C*, a ⅛ in. hole should be drilled. This prevents a vacuum, or the syphoning of the water into the pipe.

At the lowest point, *B*, of the vertical pipe *P* a ⅛ in. hole should be drilled to drain off any condensed steam which may accumulate in the pipe and which would be liable to freeze in winter.

The cap *C* and strainer, figs. 7 and 8, are held down on the cover *N* by a bolt, *D*, which has a hole drilled through its head. A wire is then passed through this hole, and it is sealed with a lead seal as shown in fig. 8. To alter the pressure on the valve the seal must be broken and the cap *C* removed. The pressure on the spring *F* can then be either increased or diminished by screwing or unscrewing the spindle *S* by its square head *a*.

The advantages claimed for this valve applied in the manner described are:

1. It renders the escaping steam noiseless; thus preventing altogether the annoyance from the disagreeable sound which attends the blowing off of ordinary safety-valves, and also the attending danger from horses which are made unmanageable by this noise.

2. The escaping steam from the safety-valve is utilized for heating the water in the tank, which effects an economy by saving heat which would otherwise be wasted, diminishes the amount of difference in temperature between the feed-water and that inside the boiler, and to some extent, probably, causes the water in the tank to deposit some of its impurities there before it enters the boiler.

3. If the boiler is managed carelessly and it is permitted to blow off frequently, the water in the tank becomes heated so much that the injectors will not work. This acts as a check on the fireman and prevents careless firing.

It must be admitted, though, that when engines are worked very hard it is often difficult to avoid blowing off steam at stations and also make time, and in some cases it has been found impracticable to blow all the steam which escapes under such circumstances into the tank without making some injectors inoperative. With "an average train of cars on ordinary grades," this need not occur, but when a locomotive is working up to its maximum capacity it is often necessary, especially if unexpected delays occur at stations, to blow off steam if a sufficient pressure is maintained to do the work required.

The following report "on the best means of preventing noise from safety valves," was made by a committee of the Master Mechanics' Association at the meeting held last year.

"It does not seem advisable to your committee to make a report of the usual kind on the subject submitted to them. The devices are of such a simple nature that no elaborate descriptions or drawings are necessary to describe them, and the results to be attained are so simple that no extended experiments are needed to determine the value of any given plan. A description, therefore, of the various devices, would simply have the value of a catalogue, and, as the plans are patented, it does not seem to your committee that any useful end would be served by their describing accurately each device, and adding to such descriptions the opinions of various parties as to the relative value of each. Speaking then, simply, in general terms, it may be said that the devices prominently before the public for this purpose are of two kinds; in the one the stream of the escaping steam is finely separated before reaching the open air, usually by passing through a chamber and thence to the open air through a number of small holes, or fine tubes, or through layers of glass beads. The second is to prevent the steam escaping into the open air at all, and to convey it by pipe to some large reservoir. In locomotives this is usually the tender. When the first method is applied to safety-valves it is open to the objection that it interferes with the delicacy of the adjustment. It is not merely that it creates a back pressure, but, what is a greater evil, the back pressure, in its action, making the valve unreliable.

"The second method avoids this trouble and has the advantage of utilizing some of the heat that otherwise is entirely lost. There is another advantage which, though incidental, is none the less real, and, indeed, forms a very valuable feature. We refer to the heating of the water in the tender. This acts as a decided check on extravagant methods of firing, for though it is very beneficial to have feed-water moderately heated—say less than 120°—a higher

heat will give the enginemen great trouble with the injectors. Excessive blowing off of steam will overheat the water, and enginemen, having once experienced this trouble, will be more careful of their fire in future. With many enginemen this check alone on reckless firing leads to a surprising economy of fuel. The difficulty of controlling the fire with engines of present construction will also be made apparent to those who design them, and this will probably lead to their engines getting proper ash-pans, with tight dampers, so that opening the fire-door will be the sole means in the engineman's power to regulate fire.

"In conclusion, your committee beg to urge upon the association the importance of dealing with the question. The noise of escaping steam, especially from safety-valves, ought to be regarded as an intolerable nuisance and a disgrace to those in charge of locomotives. We hope to see the day when engines will be built with sufficient care, and enginemen trained with enough intelligence to render the application of any special device for hiding the evidence of neglect unnecessary; but at present we are driven to use such special means for accomplishing the desired end, and, in doing so, it is best to hide, not only the sound, but the sight of the steam, for both add to the distractions, already too numerous, in railroad working."

The reports given in the accompanying table show results of working engines with and without these valves. These reports have been furnished by the Ashton Valve Company.

A comparison of the 9th and 10th columns, which show the performance of the engines without the Ashton valve, with the 18th and 19th columns, which show the performance with the Ashton blow-back valves, will indicate the saving represented by these figures. It is to be regretted that the data concerning these experiments are not a little more definite, and that the kind of service, the average train loads, and the conditions under which the experiments were made are not given. It will be noticed that the experiments with engine No. 12 on the New York & New England, with Nos. 6 and 20 on the Cincinnati, Hamilton & Dayton, and with Nos. 14 and 15 on the Wabash, St. Louis & Pacific all show a saving of over 30 per cent. in the consumption of fuel, due to the use of the Ashton valve. The saving of engine 76 compared with No. 18 on the Philadelphia, Wilmington & Baltimore road is 35½ per cent. Therefore the engine with the ordinary valve must have blown off not less than that proportion of all the steam generated. This seems almost incredible. Hardly any experienced locomotive engineer would believe that 35½ per cent. of the steam could be blown out of the safety-valves under ordinary circumstances or unless some determined effort was made to do it.

An experiment was made on the Central Railroad of New Jersey, in May, 1879, to indicate the increase of temperature of the water in the tender by the use of the Ashton valves. The latter was set to blow off at 130 lbs. pressure, per square inch, and it closed when the pressure was reduced to 127½ lbs. The following tabular statement will show the results:

JERSEY CITY TO ROSELLE, 15 MILES.			ROSELLE TO JERSEY CITY, 15 MILES.		
	Time of blowing off in seconds	Temperature of water		Time of blowing off in seconds	Temperature of water
At start		71°	At start	25	98°
Jersey City			Roselle	285	110°
Communipaw	70		Elizabeth	5	
Claremont	100		Elizabethport	70	
Greenville	10		Bay-draw	85	
Pamrapo	80	78°	Bergen	30	
Bayonne	55	80°	Centreville		114°
Centreville	70	84°	Bayonne	65	
Bergen	55	89°	Pamrapo	85	
Bay-draw	85	90°	Greenville		
Elizabethport	90	95°	Claremont	05	
Elizabeth	120	100°	Communipaw	25	
Roselle	35	101°	Jersey City	10	120°

In running from Jersey City to Roselle, the water lowered 10 in. in the tank. The running time was 50 minutes. On return to Jersey City the water was lowered 6½ in. more, or a total of 11½ in., equal to 1,000 gallons. The running time of the round trip was 1 hour and 40 minutes. The valve was open 24 minutes during the trip, or nearly 25 per cent. of the time. If the safety-valves, while they were open, blew off all the steam that was generated—and that they did so was indicated by the fact that the pressure was lowered while they were open—and if the boiler made as much steam while the valves were open as when they were closed, it will be seen that nearly 25 per cent. of all the steam generated must have escaped through the safety-valves. Probably, though, not so much water was evaporated while the valves were blowing-off as when they were not, as the table above and experience indicate that blowing-off occurs usually while the engine is standing at stations. The experiment, though, shows that some of the savings due to the use of these valves and reported in the larger table are not impossible.

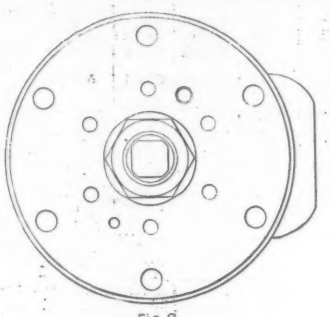


FIG. 9.
Plan with Cap removed.

These valves have been applied to marine boilers, and a pubic exhibition and trial of them, as applied to the steamer Wm. Crane, of the Norfolk & Baltimore line, was made in Boston recently. Of this experiment the Boston *Post* said:

In the presence of the representatives of the Boston press, of chief engineers of the United States Navy, and of gentlemen representing in a large way great marine interests, the order was given to 'blow off steam.' The process went on instantly and was continued for fifteen minutes, every sense being on the alert to detect it, and it was only after repeated affirmation that the valves were still blowing, that the sound could be distinguished. Careful listening over the side of the vessel finally resulted in the distinguishing of a subdued rumbling noise something like the regular noise of the pumping engine of a steamship. But the noise was nothing that would be noticed save by a person intently listening for it, and was probably caused by the proximity of the steamship to the pier. At sea the operation is said to be absolutely noiseless. In this experiment probably no person on board was conscious that this process was going on except the engineer and those who were directing the experiment. It seems incredible that boilers of from 800 to 2,500 horse-power can be silently relieved without either sight or sound of the steam."

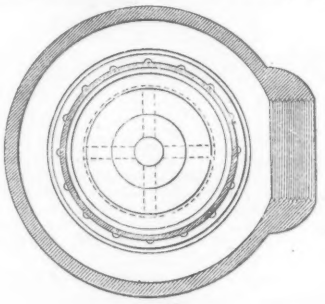


FIG. 10,
Section through Line AB.

These valves are now in use on a large number of roads. The manufacturer of the Ashton safety-valves is the Ashton Valve Company, of No. 271 Franklin street, Boston.

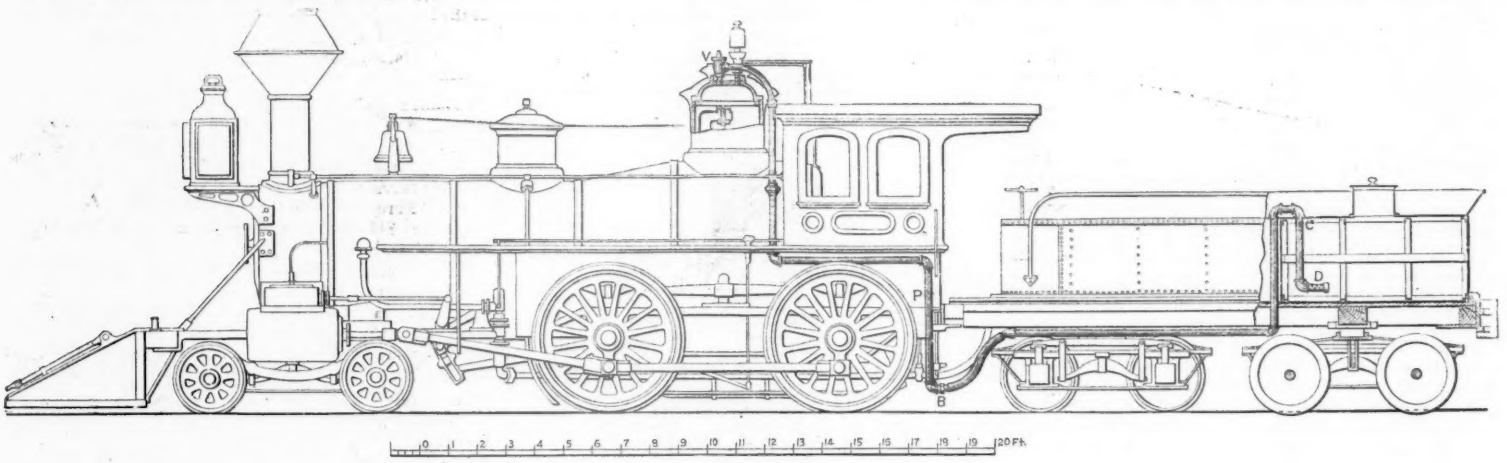


FIG. 11.

January Meeting of the Master Car-Builders' Association.

The January meeting was held on Thursday evening, Jan. 20, and was called to order by the President, Mr. Leander Garey, who announced that the subject for consideration was "Paints and Oils; their Nature, Qualities and Adulterations, and the Best Method of Mixing and Applying them."

The following paper, which was contributed by Messrs. F. W. Devoe & Co., paint manufacturers and dealers, was read by Mr. White:

SIMPLE AND PRACTICAL TESTS FOR DETECTING ADULTERATIONS IN PAINTS AND OILS.

The principal compounds used for adulterating white lead are first, barytes (heavy spar or sulphate of barytes.) Probably nine tenths of all the adulteration in white lead is composed of this material. Whiting is sometimes used, but it is not economical, as it takes much more oil to grind it than barytes. Plaster of Paris and China clay are but seldom used. Zinc can hardly be said to be an adulteration of white lead, for in many cases it improves the quality of white paint, notably in outside work, especially near the sea-shore, where pure lead is liable to "chalk" or discolor. Zinc alone on outside work is brittle; a combination of the two often forms a more lasting surface than either of them alone.

To ascertain whether a given sample of lead be pure, put as much as you can get on the end of a penknife in a glass or on a watch glass. Pour on it enough nitric or acetic acid to cover it. If it be pure lead it will dissolve readily and with effervescence. If there be any residue it will probably be barytes, for both zinc and whiting are dissolved by these acids. There is another method to determine the presence of barytes and whiting or plaster of Paris, as follows:

Take a piece of iron wire about the diameter of a pin and of any length, say of from four to ten inches. Make a small loop an eighth of an inch in diameter in one end. Take some of the material to be tested out on a watch glass with a penknife, and cover it with muriatic (hydrochloric) acid. Then with the iron loop take up a little of the mixture and hold it in a gas or alcohol flame. The lead will commence to burn off first, with a blue flame. After the lead has been consumed the barytes will flash out with an unmistakable emerald green flame, and if there be any whiting or plaster of Paris (both composed of lime) that will color the flame a brilliant carmine color.

By means of a blowpipe much can be accomplished in detecting adulterations, but it needs some experience to use it accurately. However, a jeweler's blowpipe costs but little, and it may often be of much service. If it be used with a gaslight the flames should be turned down very low, so that there is no force on the gas. The blowpipe must be put close to the flame and blown steadily. This will force out a pointed tongue of gas. A small piece of charcoal is scraped smooth, and a small hole half an inch in diameter and one-eighth of an inch deep is bored out of it, into which the material to be tested is put. The blowpipe flame is then directed on to the material, which should readily melt under its heat into bright metallic lead, *if it be pure lead*. If it be adulterated with zinc, barytes, whiting, etc., it will be impossible to reduce it to metallic lead without the use of fluxes.

There is still another practical and mechanical way of testing white lead in oil for barytes, which is easily applied by every painter. It consists in washing the pigment with spirits of turpentine. The turpentine disintegrates the pigment by cutting the oil, and leaves the ingredients to separate. A long, narrow, white glass bottle is the best to try this test in. The suspected lead is put into this bottle, and it is filled with turpentine and well shaken and allowed to settle for a moment, after which the top liquid is poured off. If there be any whiting or other light adulterant, that will be the first to come off. Fresh turpentine is now added and again agitated. If there be any barytes present it will commence to settle before the lead does. The barytes can therefore be poured off with the supernatant liquid after the lead has settled to bottom. This, with careful weighing of the materials, will furnish a substantially accurate quantative analysis, so far as the barytes is concerned.

Linseed Oil.—The detection of adulterations in linseed oil is one of the most difficult problems that even a chemist has to contend with. The presence of other and cheaper oils in a given quantity of linseed oil cannot with certainty be determiued by any known scientific analysis. The sense of taste and smell are, after all, the most available practical guides, and yet manufacturers have succeeded so far in deodorizing oils that the addition of quite a large percentage of adulterants cannot be detected even by the acute senses of an expert. There are, however, some chemical tests; for instance, an excess of crude nitric acid mixed with a suspected linseed oil and agitated will indicate the presence of fish oil by the dark brown discoloration of the oil which follows. Pure linseed oil under the same treatment would be changed to a sea green and finally greenish yellow, while the acid itself becomes yellow. Rosin oil to any extent is also indicated by adding to one part of the suspected oil, in a small vial, three parts of pure linseed oil. If the sample contains a rosin oil the pure linseed floats on the top and the line of contact is plainly visible.

Dry Colors.—Their value depends on their staining or coloring property when mixed with a white base. This coloring power, or strength, is dependent upon, first, the inherent strength of the color, the amount of the adulteration, and secondly, on the degree of fineness to which it is reduced in grinding; thirdly, on the treatment to which it has been subjected.

Of course there are accurate chemical tests by which the nature and amount of adulteration in dry colors can be determined, but the methods are rather beyond the reach of the general consumer.

In almost any paint store one may see packages of color ground in oil or Japan containing a pound of color, into which it would not be possible to get a half pound of pure color of the same kind. The necessary inference is that it is adulterated with barytes. But it could be adulterated with some lighter material, such as whiting, where the test of bulk would not be certain.

In the case of dry colors, the comparative staining or coloring property, or, as we shall hereafter say, the strength, may be determined by carefully weighing out of each color

the same amount, grinding it down finely with linseed oil on a slab, and to each of these equal amounts add equal amounts of white lead in oil and mix thororoughly. As between two colors of the same kind, that is, of course, the best which most strongly stains the white lead. The adulterants most generally used in dry colors are the same as used in white lead and zinc—barytes, whiting, China clay, etc. They can be detected by the same methods as when they are used for adulterating white lead and zinc. Of course, by every ounce of these substances added is the staining power of the pigment reduced.

In conclusion, we would state that there is no more difficulty experienced in buying paints than there is in any other line of manufactured goods. Is it not difficult to buy a silk that is not sized and filled with China clay? Are not baking powders adulterated with alum? Are not all food products more or less tampered with? A scientific man has lately said that this was an "age of adulteration." What is your remedy for such methods? It is simply to buy your goods of a responsible house whose word is as good as a certificate of chemical analysis.

Papers referring to the same subject were also read by Professor Hornbostel and Mr. Murphy. After these were heard, Mr. GAREY asked the manufacturers whether if a sample of dry and liquid color was furnished, eight or ten of them could make the same color having the same durability, etc. One of the difficulties which railroad companies labor under is that they cannot get the painters at the various shops to mix colors that will be uniform. Cars in the same train, and often painted in the same shop, will often be faded very differently when they fade at all, and the most of them do. If it were possible to go into the market and buy colors ready mixed, without having one house monopolize the business, some of the difficulties would be removed.

Mr. WEAVER inquired whether Calcutta or American linseed oil was the best.

Mr. MURPHY replied that for their purposes (making varnish) they prefer Calcutta oil. Other manufacturers prefer American oil. After all it is a question of age and purity of seed more than anything else. If the seed is pure, for the ordinary mixtures of paints the difference between Calcutta and American seed will not be noticeable. The test to which varnish-makers put oil is very severe. They run oil up to 560, which is a heat it would be wholly impracticable to use on oil for car purposes.

A gentleman inquired whether the transportation from Calcutta may not be what gives the oil age.

Mr. MURPHY said the oil was made here, the seed being brought over. The favorite seeds with varnish and oil-cloth makers is either the Calcutta or the Black Sea seed. It is ground into meal, and then the meal is put into bags four feet long by about 15 in., and these bags are then put into hydraulic presses, and the oil is pressed out. The oil is then put away to settle. It requires about three months after oil is made to mature or be fit for use.

Mr. GAREY said that the position and duties of a car-painter are peculiar. He is expected to produce good work that will wear well in as short a time as possible, while the ingredients which are provided for him are purchased by a man who is employed by the company to buy everything as cheap as he can. He is paid a large salary to scour the market and get what goods are required by the painter as well as in other departments at the very lowest price. In that way he will buy perhaps this month of one manufacturer and the next month of some other party, and he shifts about from one to another. The painter receives colors from month to month which are not alike and which perhaps are very difficult for him to mix. Now, could the manufacturers help them out of this difficulty in any way?

Mr. STEVENS said that painters generally use too many colors to produce the desired tints. Manufacturers often put paints together without any chemical knowledge or any knowledge of the use of paints.

Mr. GAREY asked whether there was any objection to having colors furnished to them ground—not mixed ready for applying, but simply ground.

Mr. ROTH thought not. No two firms with which he had dealt mix them alike. The fresher a color is, the better the job.

Mr. WELLS said the trouble in getting colors mixed was with the liquids. He wanted to know just exactly what the colors were ground in. Colors will not stand alike. The natural colors probably will. He never mixed colors by night.

Mr. ROTH said the best way to mix colors was by weight.

Mr. STEVENS said the strength of pigments differed. Even umbers and others, which are natural colors, differ a little. There are many imitations of colors. They cannot therefore depend upon getting the same tint by mixing colors by weight.

Professor HORNBOSTEL said that paint is an extremely sensitive thing. At the factory of Brewster & Co. (carriage makers) they found that the gases developed in the blacksmith's shop, which is in the basement, had a very detrimental effect upon the paints and upon the lasting of the carriages which were in their shop. Since they got rid of those gases they had none of that trouble.

Mr. WILLIAMS said that about a year ago a certain master mechanic condemned the vermilion his firm had furnished because it turned dark, and at his suggestion the firm made a series of experiments. They took a number of panels about 6 to 8 in. wide by about two feet long. They painted some of them with an Indian red, and others with white, and then took a number of panels of each kind and coated them with vermilion, varnished a portion of the panel, left another portion unvarnished, and took these various panels, all painted in that way, and covered one-half of each one by nailing a piece of board over it, and then exposed them to the weather on top of a building. They were left there for three or four months and then taken down, when they washed them off and took off the boards, and every one of the panels had faded. They used Japan in some of the colors and some they used them without it, and they found that in every case they had faded, and then there was little difference in the character of the fading. They used both Atkinson's English vermilion and different kinds of what they call English vermilion, which is manufactured by makers in New York, and they could distinguish no difference in those either.

The meeting then adjourned.

The Freight Steamer.

Although a great deal has been said concerning the improvement that has been made in naval architecture during the past 25 years, perhaps the most forcible presentation of the change is that by Mr. William Pearce, of the ship-building firm of Messrs. John Elder & Co., in a lecture recently delivered at Glasgow. The firm of which he is a member has been engaged for many years in building large ocean steamers, and, if we are not mistaken, launched last year a larger amount of tonnage than any other builders upon the Clyde. For this reason Mr. Pearce is in a position to speak from wide experience, and the statements he makes must be taken as conclusive. For the purpose of comparison he takes the Cunard steamship *Persia* as the type of the old class of ocean steamship, and the *Arizona*, of the Guion Line, as a type of the vessels of to-day, although it is quite possible that the performances of some of the lately launched steamers that are to cross the Atlantic this year will surpass in economy and speed the record of the last-named vessel.

The steamship *Persia* was launched in 1856, and was, at that time, considered the finest ocean steamer afloat. She was the "crack" ship in the Cunard Line, and, as many will remember, was a favorite for years with all Americans making the trans-atlantic voyage. She had side-lever engines indicating 3,600 horse-power, and consumed 6.7 pounds of coal per horse-power. But her engines were so cumbersome, and the consumption of coal was so great, that in a voyage from Liverpool to New York she was only able to carry 250 tons' weight of cargo. This made the carrying of cargo a highly expensive operation, for in the voyage the vessel burned 6⅔ tons of fuel for every ton of freight on board, and even with this outlay her average speed was not more than 13 knots per hour. The *Arizona*, which has compound engines, has an indicated horse-power two-fifths greater than that possessed by the *Persia*, and consumes but 1¾ pounds of coal per indicated horse-power. But what is of even more importance, she can carry, in addition to her fuel, 3,400 tons' weight of cargo, and can steam at an average speed of 16¼ knots to the hour, thus burning but one-fifth of a ton of coal for each ton of goods she carries across the Atlantic. To make the comparison complete, it may be said that by means of her compound engines the *Arizona* can develop power at one-fourth of the ratio of expense required to develop it on board of the *Persia*, while, on account of the compactness of her engines, her smaller area of coal bunkers, and her greater size, the *Arizona* can carry a ton of cargo at one-thirtieth of the outgo in coal required on the *Persia*, and this, too, at 25 per cent. greater speed.

It would be impossible to indicate in a clearer manner than this the causes for the great revolution in trade which has taken place within the last fifteen years, and which has driven the sailing tonnage of the world off of so many of the great routes of commerce. When a ton of cargo could only be carried at six times its weight in fuel, the carrying of cargo was of necessity an expensive operation. The steamers at that time took no freight except first-class goods, upon which high rates of freight could be paid without materially increasing their cost. The rates of freight before the war averaged from £6 to £8 per ton, and at times they were higher even than the last-named amount, while the sailing vessels of that time received what would be the steamer rates of to-day. With the changed conditions, brought about chiefly by the invention of compound engines, it is easy to see that the sailing vessels have no longer a firm grasp on any but the very longest ocean voyages, and then only on the carrying of cheap and undesirable cargoes. For it must be remembered that while the *Arizona* is a good specimen of a fast-sailing passenger and freight steamer, there are steamers now plying across the Atlantic, taking four or five days longer to make the trip, that carry fully as much cargo as she does, and yet burn on the voyage only about one-third of the average amount of coal consumed by her engines. It is to vessels of this latter class that the merchandise exported from this country is gradually falling, and in the immediate future their share in this trade will be even larger than it has yet been; for, by avoiding extreme speed, and by utilizing the space devoted on other steamers to passenger accommodations, these large freight carriers will soon be able to take merchandise across the Atlantic at much lower rates than sailing vessels have ever been able to with profit to their owners. This is a feature in the carrying trade which members of Congress, who are so solicitous about reviving our American commerce, would do well to bear in mind. If we desire to get our share of the millions of dollars paid out annually for transporting American produce, we must do it, not by maintaining fast lines of mail steamers, but by owning and sailing freight-carrying vessels of large tonnage that can steam from 250 to 275 miles per day, with no greater consumption of coal during that period than a householder ordinarily has in his cellar. These are the freight carriers of the future and the craft that American merchants need to supply themselves with.—*New York Times, Feb.* 16.

The Production of Bessemer Steel in the United States in 1880.

We have received complete reports from the eleven Bessemer steel works of the United States detailing their production in the calendar year 1880, and promptly lay the statistics thus received before our readers. The production was larger than the estimate we formed of it at the close of the year.

The total quantity of Bessemer steel ingots produced in the United States in 1880 was 1,203,173 net tons, or 1,074,262 gross tons, against 928,972 net tons in 1879, 732,226 net tons in 1878, and 560,587 net tons in 1877. The increase over 1879 was 274,201 net tons, or 30 per cent.; over 1878 it was 470,947 net tons, or 64 per cent.; over 1877 it was 642,586 net tons, or 115 per cent. The production of Bessemer steel ingots in this country from 1872 to 1880 was as follows, in net tons:

1872	120,108	1877	560,587
1873	170,652	1878	732,226
1874	191,934	1879	928,972
1875	375,517	1880	1,203,173
1876	525,996		

The total quantity of Bessemer steel rails produced by these eleven works in 1880 was 917,592 net tons, or 819,279 gross tons, against 683,964 net tons produced by the whole country in 1879, 550,398 net tons in 1878, and 432,169 net tons in 1877. The total Bessemer steel rail production of the country from 1872 to 1880, not including rails rolled by iron mills in 1880 from purchased blooms, was as follows, in net tons:

1872	94,070	1877	432,169
1873	129,915	1878	550,398
1874	144,944	1879	683,964
1875	290,863	1880	917,592
1876	412,461		

Several iron rolling mills rolled Bessemer steel rails in 1880 from purchased blooms, and reports of their operations have not yet been collected from those establishments, but perhaps 50,000 net tons of such rails may have been rolled by them last year.

Although the Bessemer steel production of 1880 was very large, it will be greatly exceeded in 1881. The Vulcan Steel Works, in St. Louis, did not get into operation until March 10, 1880; this year they will make full time. All the other old works are improving on their productions of last year, and some of them will have an enlarged plant at work, notably the Bethlehem Iron Company and the Pennsylvania Steel Company. Several new Bessemer steel establishments will get to work in 1881, the Pittsburgh Bessemer Steel Company, Limited, being now about ready to begin production, with a capacity of 60,000 gross tons of ingots a year, while the North Chicago Steel Company and the Colorado Coal & Iron Company are pushing their works to completion as rapidly as possible, with a prospect of turning out Bessemer steel before the snow of another winter will have made its appearance.—*Journal of the American Iron and Steel Association.*

The Humane Society and Improved Cattle Cars.

The following "Judge's Circular, No. 2," entitled "General Notice to Competitors for the Improved Cattle Car Award," has been issued over the signature of Edwin Lee Brown, President of the American Humane Association:

CHICAGO, Feb. 1, 1881.

To all competitors: The time for receiving models and plans for "an improved cattle car," as specified in our circular of July 12, 1880, having expired Jan. 1, 1881, the undersigned, to prevent unnecessary correspondence, respectfully gives the following information:

We have received 420 models (*of which number thirteen had no names or address on them*, so that we know not whence they came); and *about* 200 plans and sketches (which are not all listed yet, so we cannot give the exact number).

In the short time which has elapsed since Jan. 1, and during which we have been busy at work listing the articles received, we have received *numerous* inquiries from competitors, asking *why* we do not announce the name of the winner, return the models, etc., etc. (some, we regret to say, insinuating that our decision is being kept "quiet" from corrupt intent on our part).

We would respectfully suggest, in answer to these inquiries, that it should be manifest to any one who would give the subject a little thought, that, to bring all these models, plans and descriptions into shape (some of the descriptions being scattered over half a dozen letters of different dates); to compare them with the *one hundred and eleven* (111) *United States patents heretofore granted for stock cars*, so to reject all which are not new; and, finally, to decide which shall be entitled to the award, involves a vast amount of labor—labor which could not be properly performed in less than several months' time, in our opinion, even were the judges to entirely neglect their own business and give their whole time to this work.

The decision of the judges, when arrived at, will be made known to the American Humane Association, which Association will act on that decision, and give due notice of its final action—all as specified in our circular of July 12, 1880. *Until that time no one will known the result of the award.*

It is possible that quite a number of models are now lying at the different express offices in this city, not having been received by us, because the express charges had not been prepaid; so that any person who has sent a model to us, for which he has not received our *acknowledgement*, had better have the express agent to whom he originally *delivered* the package trace it up.

Many applications have been made to us, by members of the press, and others interested, to examine the models and plans submitted, which applications have, thus far, invariably been declined. When all the judges shall come together (*after* the clerical and expert work has been done) for making the final decision, it will be competent for them to decide on the above point. In the meantime, if any competitor is *unwilling* that his model or plans should be seen as above, he will please notify us.

It is our intention to send this circular to each competitor from whom either a model, plan, sketch or written suggestion has been received; should any person, however, who has forwarded either of the above to us, not receive this circular, and learn of its issuance, through the press or otherwise, we will forward one on application; *in which case* he will consider it an acknowledgement of the receipt of his shipment, unless otherwise notified in writing.

In closing, we would say, that this circular is designed *as an answer to all questions* until the determination and publication of the award; so that written answers to inquiries need not be expected from us hereafter, unless in exceptional cases.

THE SCRAP HEAP.

Narrow Gauge in India.

One of the Indian correspondents of the *Times* states that the opponents of the metre gauge for Indian railways have secured a triumph in the selection of the broad gauge for the new Bhopal line. It is believed that this in a great measure is due to the objections to the narrow gauge urged by the clever Begum of Bhopal. It is now almost universally admitted that the metre gauge is quite inadequate for traffic on all except some small branch lines, and there seems to be little doubt that it will eventually become necessary to reconstruct the Rajpootana and other important systems of railway on the standard gauge.

Preserving Lamp Chimneys from Cracking.

The following recipe for keeping lamp chimneys from cracking is taken from the *Diamond*, a Leipsic journal devoted to the glass interest. Place your tumblers, chimneys or vessels, which you desire to keep from cracking, in a pot filled with cold water; add a little cooking salt; allow the mixture to boil well over a fire, and then cool slowly. Glass treated in this way is said not to crack even if exposed to very sudden changes of temperature. Chimneys are said to become very durable by this process, which may also be extended to crockery, stoneware, porcelain, etc. The process is simply one of annealing, and the slower the process, especially the cooling portion of it, the more effective will be the work.

Starting Fires in Locomotives with Gas.

The *English Mechanic* says: "The practice of starting the fires of locomotives with gas instead of wood, is now, we learn, adopted to a considerable extent in Germany, *e. g.*, on the Royal Eastern Railway, at Berlin: it proves economical. The apparatus of Herr Siegert is there used. It consists of a horizontal tube, and several vertical tubes with burners. Each vertical tube has a nozzle in which the gas mixes with air drawn in laterally, before issuing at the copper burner. The lighting of the anthracite coal on the grate is done in 10 to 20 minutes, according as the gas pressure varies between 20 and 15mm. The method is as follows: In a gap between the bars is inserted from below an iron plate the length of the system of burners, and so that it projects 100mm. above the grate-surface. Then three or four shovelfuls of dry coal-pieces about the size of one's fist are placed about the plate, and the rest of the grate-surface is covered 100 to 150 mm. high with coal. Then the plate is drawn out, and the system of burners put into its place; 300 litres of gas lights the coal sufficiently. In the course of 30 to 45 minutes, according as the locomotive was previously warm or cold, the burning coal is pushed apart, so that the fire may extend as quickly as possible over the whole grate. The gas is conveyed to the burner-apparatus through a tube of caoutchouc from a small gas-holder, and the pressure can be easily varied at will. The apparatus is supplied by Pintsch, of Berlin, at the price of 85 marks ($17). An improvement introduced by Siegert in his apparatus consists in doing away with the nozzle of each burner, and producing the mixture of gas and air by means of a single nozzle in the connecting pipe."

they were open, blew off all the steam that was generated—and that they did so was indicated by the fact that the pressure

TIONS IN PAINTS AND OILS.

The principal compounds used for adulterating white lead may be determined by carefully weighing out of each color

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S WRIGHT DUNNING AND M. N. FORNEY.

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EDITORIAL ANNOUNCEMENTS,

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

RAILROAD EXPERIENCE IN MEXICO.

Within the past year several companies in this country have been organized to construct railroads in Mexico, and some of these have planned long lines and considerable railroad systems, and have raised large amounts of capital, and have now a considerable force in Mexico engaged in making surveys and in construction.

Considering the large amount of capital which these projected railroads will require, it seems strange that so little definite information has been published concerning the traffic resources of Mexico, and especially of the population, production and existing commerce of the towns and country on the projected lines. If such information has been collected by any of these companies, it has not been published, and apparently the capital has been subscribed on the assumption that in Mexico, as in the United States, when a large area of fertile country is made accessible by rail, it will immediately produce and ship large amounts of freight, and that the traffic of Mexican towns of 25,000, 50,000 and 100,000 inhabitants cannot be greatly different from that of towns of the same size in this country. It is especially remarkable that no investigation has been made, for Mexico is not entirely without railroad experience. The Mexican Railway Company is more than seventeen years old, and a considerable portion of its road was in operation before the French intervention, and its line from Vera Cruz, the chief Mexican port, to Mexico, the capital and a city of 200,000 inhabitants, was opened as long ago as 1873.

It has seemed to us that the experience of this English company is worth the attention of all who take an interest in the newer Mexican railroad projects, and we have therefore procured from the company and made some study of the last four half-yearly reports, with the chairman's speeches at the meetings at which they were submitted; and the reports are especially valuable for this purpose, because they contained detailed statistics of the traffic of the road ever since it was opened through.

The Mexican Railway consists of a main line 264 miles long, from Vera Cruz westward to the city of Mexico, and a branch from Apizaco (87 miles east of Mexico) southward 29 miles to Puebla, and another branch, which, however, is a horse railroad, from a junction 9½ miles out of Vera Cruz northwest, 61¼ miles to Jalapa. It seems strange that so long a section of road through a thinly settled country should be worked by animals, but this is not uncommon in Mexico, and a tramway 34 miles long, from the Mexican Railway (not owned by it) south in the direction of Oaxaca, was opened near the end of 1879, and there are other long ones in the interior not connected with any railroad. The Mexican Railway Company thus works 354¼ miles of railroad.

The road was begun long ago, and was constructed at great cost and under many difficulties and complications. The ascent from the low lands to the great Mexican plateau was very costly and took long to accomplish, and the company was obliged by its contract with the government, we believe, to build the 116 miles between Mexico and Puebla before the line up the mountain was completed, so that all the material for it had to be hauled by animals up this difficult road. Revolutions and the French intervention further complicated matters.

The report for the year 1879, in many respects (especially with regard to the traffic) much fuller than ordinary English railroad reports, gives no inventory of rolling stock, but the amount must be small, as the train mileage is equivalent only to about two trains each way daily over the whole mileage.

The capital of the company June 30, 1880, was as follows:

Ordinary shares	£2,254,720
First preference 8 per cent. shares	2,554,100
Second preference 6 per cent. shares	1,011,960
Total	£5,820,780
Perpetual debenture stock (6 per cent.)	2,000,000
Total capital issued	£7,820,780

The debenture stock is equivalent to a bonded debt, except that the principal is never due. It was issued early in 1880 to retire four different classes of 7 and 8 per cent. bonds amounting to nearly the same amount, but payable on three months' notice to the holders,

The first preference 8 per cent. shares were issued in lieu of outstanding 8 per cent. bonds, and the second preference 6 per cent. shares were issued in discharge of interest received and unpaid. The dividends on these are due only when earned and do not accumulate. Of the ordinary shares £700,000 (nearly one-third) are owned by the Mexican government.

This capital is at the rate of £22,074, or $107,290, per mile of road, or only $27,465 of which is the interest a fixed charge, amounting to $1,648 per mile.

From the earnings of 1879 the interest of the bonds was paid and also a dividend of 5 per cent. on the first preference shares, leaving the ordinary and second preference shares, which form about three-sevenths of the capital, without return. In the first half of 1880 the profits had so much improved that full dividends on both first and second preferred shares (4 and 3 per cent., respectively) were paid, and also ¼ of 1 per cent. on the ordinary shares (the latter dividend requiring less than $29,000). In that half year $292,000 were received as a government subvention, which has been paid, more or less regularly before. A recent settlement with the government fixes this subsidy at $560,000 a year, for 25 years from 1868.

On that account the company has received $1,200,000 since March 1, 1875. No dividend on any class of the stock was paid until 1880.

The net earnings of the road in 1879 were at the rate of $4,930 per mile of road, and in the first half of 1880 at the rate of $2,855 per mile—which will pay good interest on a high cost of construction.

This position, however, has been reached only after long years of struggling, during which only a very small part of the capital received any return. Thus the gross earnings, working expenses and net earnings for five years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1875	$2,370,605	$1,387,110	$987,495
1876	2,178,147	1,348,465	829,682
1877	2,700,907	1,535,910	1,164,997
1878	2,894,252	1,474,190	1,420,062
1879	3,257,235	1,462,819	1,794,416

The earnings, by the way, are in silver, which is the standard currency in Mexico; the expenses are also in silver, but the large discount in this metal is felt greatly on all remittances to pay interest and dividends in England, as appears from the report for the first half of 1880, in which there is a charge of about $140,000 for losses on exchange and cost of remitting—a very considerable proportion of the net revenue for that time.

The main line and the Puebla Branch of this company form the great trafficartery of Mexico. Parts of the country on the line are pretty well peopled. The city of Mexico several years ago was credited with a population of 200,000; Puebla, with 100,000, and Orizaba with 30,000, while Vera Cruz is the only Mexican port of any importance on the Atlantic coast. Within 200 miles or so of its western terminus at the city of Mexico there are five or six other cities of 30,000 to 70,000 inhabitants, that have no other outlet to the sea than this railroad, and must receive by it nearly all the foreign-manufactured goods that they consume. It would hardly seem possible to construct a railroad anywhere else except in China or Japan that would have so large a population and so large an area of productive country tributary to it. But this Mexican trunk line has anything but a heavy traffic, and though its business has grown considerably of late years, in 1879 it was sufficient to occupy but about two daily trains over the whole length of the road, and the entire freight shipments at all the stations on the 293 miles of steam road were but 195,618 tons. As this may not convey any idea to readers unfamiliar with railroad or other carrying business, we will compare it with the shipments of some American stations. It is about equal to the shipments from Dunkirk, N. Y., over the Lake Shore & Michigan Southern Railway alone, and to less than its shipments from Erie, to one-fourth of its Toledo shipments, and to less than one-ninth of its shipments from Cleveland. The Cleveland, Columbus, Cincinnati & Indianapolis received for transportation more freight than the Mexican Railway's whole business in 1879, at its Columbus station, a sixth more at Springfield, and not a fifth less at Muncie.

The Mexican company's reports gives the amount of shipments in each direction from every station. The largest traffic is at Vera Cruz, where, in 1879, the shipments amounted to 47,116 tons, or an average of 118 tons daily. Next stands the station Yrolo, which, probably, most of our readers never heard of before. Its shipments were 26,233 tons, and all but 22 tons of it westward, or toward the city of Mexico. It is, probably, the headquarters for shipping pulque, the fermented juice of the maguey, which is to the Mexicans what lager bier is to the Bavarians, as may be judged by the fact that more than one-third of all the freight carried on the road in 1879 was pulque. No other station on the road shipped as much as 20,000 tons of freight, and the city of Mexico itself, a place of more than 200,000 inhabitants, situated in the midst of a populous and fertile country, which has no other outlet, *shipped but* 9,908 *tons* of freight, and that was more than in any previous year and nearly twice as much as in 1878. Less than 2,000 tons of its shipments in 1879 were for exportation, and the total shipments of freight declared for exportation at all stations on the road were but 11,095 tons! Many a town of 5,000 inhabitants in this country ships more freight than the great city of Mexico. The city of Peubla, with 100,000 inhabitants, shipped 12,665 tons of freight in 1879; Orizaba, with 30,000 inhabitants, 7,164 tons.

But if this is the traffic of the great trunk line of Mexico, what do subordinate lines get? The report shows that at the three stations on the 29 miles of the Puebla Branch (included with the above) the shipments in 1879, when they were largest, were 12,741 tons. The traffic is not reported for the Jalapa tramway, but its gross earnings (including earnings on 9½ miles of the main line, over which the Jalapa traffic is carried) were as follows for the several years since it has been open:

1877.	1878.	1879.	First half of 1880.
$61,603	$77,530	$95,963	$52,355

The net earnings of this line were $4,091 in 1878, $17,748 in 1879, and $5,945 in the first half of 1880.

This is for the whole 61¼ miles of road, so that the largest year's profit so far has been $290 per mile. The company received a subvention of $185,000 for this line, but we believe that it receives no yearly contribution on this account.

Now this shows very clearly that the supply of traffic in Mexico is but an insignificant fraction of what would be supplied in this country by a territory of equal area, fertility and population, and when we plan railroads for Mexico we should plan them for Mexican circumstances and not for those to which we are accustomed at home, otherwise we are likely to be grievously disappointed in the results. It will not do to say that there would be a great freight movement if there were any means of transportation. The Mexican Railway has been in operation many years, and though its traffic does grow, and grows quite rapidly, we see that what it has grown to be is still so light, especially in freight, that only our poorest roads have so little. As for the growth on the Mexican road, from 1875 to 1879 there was an increase of 18 per cent. in passenger traffic and 36 per cent. in freight traffic (ton miles).

With so light a traffic, then, how is it that the Mexican Railway makes a net profit of about $5,000 a year

per mile of road? The answer is, by collecting enormous rates on freight.

The average rates received in 1879 were 3.165 cents per passenger mile, and 14.53 cents per ton per mile. The passenger rate is exceeded on many roads in this country, but the freight rate is nearly 20 times the average reported on the New York railroads in 1878–79, and is equivalent to a rate of $7 per 100 lbs. from New York to Chicago, which is more than nine times the rate on first-class freight between the two places, and just twenty times the present grain rate from Chicago to New York.

It may be said that traffic is stifled by so high a freight rate. But it must be remembered that this is the *average* rate, and that probably this company, like nearly all others, is glad to carry at a small profit freight which at a higher rate it would lose entirely. The report shows that in 1879 the average rate on freight exported was but 3.77 cents per ton per mile, or little more than one-fourth of the average rate, while the average on foreign merchandise was no less than 22 cents per ton per mile, which is at the rate of $2.90 per 100 lbs. from Vera Cruz to Mexico.

The Mexican Railway is a costly road to work. High as its rates are, its working expenses in the first half of 1880 were 42.2 per cent. of the earnings, and the average expense per traffic train-mile was no less than $3.06½ (against $1.09 on the New York, New Haven & Hartford, $1.05 on the Philadelphia, Wilmington & Baltimore, $1.45 on the International & Great Northern, $1.24 on the Texas & Pacific, $1.05 on the Atchison, Topeka & Santa Fe, and $1.89 on the Central Pacific). Further, the Mexican freight trains are exceptionally light, averaging in the half-year mentioned only 57½ tons of paying load, which is less than half the average here, and not more than a quarter of the average of some of our lines. The passenger trains at the same time had an average load of 121, which is about double the average in this country. Now when freight is hauled in trains of 57½ tons at an expense of more than $3 per train mile, a pretty large rate is required to yield a profit, and when a road costing more than $100,000 per mile gets its support from an average of 74 passengers and 77 tons of freight each way daily (as on the Mexican Railway in its most prosperous half-year), it must get a large profit on each unit of traffic.

It is evident that such freight rates as the average on the Mexican Railway can be paid only on valuable goods, such as merchandise imported, and it is further evident that no new road is likely to have so large a traffic in these goods as the Mexican Railway now gets; for this road now carries all the imported merchandise consumed by probably more than one-half of the Mexican population, including what is now consumed by most of the population on the lines now under construction. Under the most favorable circumstances these roads, therefore, can be expected to have but a very light traffic, and one that cannot pay as high rates as the Mexican road now gets. Two things then are all-important if the new roads are to be financially successful: first, a low capital cost; and, second, lighter working expenses than those of the existing road. For most of the projected lines both these should be perfectly practicable. The Mexican Railway had to ascend the extremely difficult ground between the coast and the plateau of Mexico, and its capital cost was further swelled by the disturbed condition of the country while it was under construction. Further, the steep grade of this ascent is very difficult to work, only very small trains being practicable—an obstacle not much felt now, probably, because there is not yet traffic enough for one full train each way daily, and probably one would be run daily, if there was not half so much traffic. But in any case very high rates on all the freight that will bear them will probably be absolutely indispensable to the support of any railroad in Mexico until there has been a revolution in its production and commerce, and as the rates are always limited in Mexican concessions, this especially needs looking to. It seems not always to have been considered. We find in the charter for the proposed railroad through the state of Oaxaca that the passenger rates are limited to 0.8 cent per mile for the third class, 1.6 cents for the second, and 2.4 for the first, and this in a country where at least two-thirds of the people will travel third-class. For freight the rates per ton per mile for these classes are limited to 4.4, 5.83, and 7.3 cents respectively, the highest of which is but about half of the average rate actually received by the Mexican Railway. The charter of the Mexican Central Company limits the charges for passengers to 4.8 cents, 3.2 and 2.4 cents per mile for the three classes, and for freight to 8.7, 5.8 and 3.6 per ton (of 2,000 lbs.) per mile. The first class rate being about 40 per cent. less than the *average* rate actually received by the Mexican Railway. It is true that these rates would be very high in this country, but as we have said it is an egregious mistake to plan Mexican railroads to suit the circumstances of the United States. Production, industry and commerce are wholly unlike in the two countries.

RECENT DECISIONS ON PASSENGER TRAFFIC.

The Court reports published during a few months past embrace a number of decisions upon questions connected with passenger traffic, which are well worthy of consideration in their connection.

Who is a passenger? is one of these questions. Many readers will remember a Pennsylvania decision, noticed quite extensively in the press a year or two ago, declaring a mail agent, traveling in charge of the mails, entitled to claim damages as a passenger for any personal injury. Recently the Supreme Court of the state has reversed the decision. The judge below considered that a passenger is any one who travels in a public conveyance, and that the circumstance that a traveler is pursuing an employment while on his way, or that he is carried without any specific fare or ticket, does not deprive him—so long as he is not a trespasser or mere dead-head—of a passenger's right to be carried safely. Such has been the well-known course of decisions in cases apparently quite analogous, such as those of express agents, live-stock drovers, peddlers of refreshments, etc., all which classes have been at different times adjudged passengers on the ground that, although they do not buy a ticket for each trip, yet the company is paid for carrying them by the general contract in virtue of which they ride. The Supreme Court points out a difference between these persons and a mail agent traveling under authority of a law of Congress, and necessarily engaged, while on the journey, in the care of and even in assorting the mails. If the companies are held to high liability for a passenger's safety, they ought to have, and they do have, authority to make and enforce regulations diminishing the danger as much as possible. Thus passengers are required to ride in the passenger cars and to refrain from various exposures. A company could not enforce such rules over a mail agent. He, for example, cannot be placed in a passenger car, but necessarily rides in a mail car—a place of greater danger. As the company has no control over him, it ought not to be considered responsible for his safety to the same degree as for that of a fare-paying passenger. Accordingly—under a special statute of Pennsylvania (1868), which declares that when a person lawfully upon a train, but not a passenger, is injured, he shall not have any higher right of recovery than if he were employed by the company itself—damages were denied for the killing of a mail agent in a collision caused by the train hands; although, if he had been considered a full passenger, they must, under the circumstances, have been allowed.

Nothing very new is established by the following decision from Maine. A foreman of a section, whose duties required his running back and forth on a hand-car, invited a friend to take a free ride with him. The friend accepted; the hand-car was wrecked in collision with a train, and the friend was killed. The Court said the company was not liable. There was no contract; and there is no public duty upon the companies to carry passengers safely on hand-cars. Unless the company holds itself out as accustomed to carry on its hand-cars any person asking to ride, the hands in charge of such cars have no authority, by inviting or permitting persons to ride on them, to involve the company in obligation for their safety.

Safety of passengers is involved, in another aspect, in a decision by the Supreme Court in Washington, just announced. At Danville, in Tennessee, the trains of the Louisville & Nashville Railroad Company and the packet boats of the Evansville & Tennessee Packet Company make connection. The landing place and depot grounds are the property of the railroad company, the steamboat company making some compensation for using them. Late one stormy night a traveler, who had come by the railroad to Danville for the purpose of taking the steamboat, and had spent the evening at the hotel awaiting her arrival, started out, when the whistle was heard, to go aboard. His way lay through the depot; a route for passengers going to and from the steamboats was there provided by the railroad company, and there was no other. This path was not unsafe in itself, but it was unlighted, and on each side were unguarded hatch-holes. Into one of these the unfortunate passenger, straying a little aside from the path in the darkness, fell. He was badly hurt. No fault or want of care could be imputed to him, and the railroad company resisted his suit for damages on the sole ground that as he did not hold a through ticket, and was not passing through the depot in virtue of any contract of the company to carry him, there was no corporate obligation for his safety. But the Court adjudged him entitled to recover irrespective of any relation of carrier and passenger, upon the principle that the owner or occupant of real property who, by invitation, express or implied, induces or leads others to come upon his premises, is liable to visitors, who come for lawful purposes and use due care, for injuries they may sustain through unsafe condition of the premises, known to and neglected by the proprietor. A railroad company is in duty bound to keep the public parts of its depots or stations in safe and proper condition for the visits of all those who come thither on proper business connected with the operations of the road, and cannot disclaim liability for an injury sustained through an unexcused defect, by showing that the injured person was not the holder of a ticket.

Expulsion of passengers has been drawn in question in two curious cases. One arose in Indiana. An intoxicated passenger, riding from Milford Junction to Cromwell, offered 25 cents for fare. Now the true fare was 35 cents, but the conductor, willing to avoid a difficulty with a drunken man, accepted the quarter and passed on. Passing through the car again a few minutes later, he found that the objectionable passenger was loudly boasting to the others that he had "beat" the conductor, and advising them that it was no use to pay fare; anyone could travel without paying. The conductor then told him that unless he paid the other 10 cents he would be put off. He refused; the train was stopped on the spot—without waiting for arrival at a regular station—and he was ejected. The Court sustained the conductor's proceedings. It is true that a statute of the state says that a passenger who refuses to pay may be put out "at any usual stopping place." But the judges said that this sort of statute ought to be regarded as a police regulation for the purpose of protecting the traveling public from the dangers incident to unnecessary stops between stations. A passenger who refuses to pay fare has no ground of complaint because he is put out between stations; if he might insist on riding to the next station he could, after being put off there, get on again, insist again on being carried to the next station, and so make a long trip free. The taking the 25 cents did not deprive the conductor of the right to claim the other 10. Moreover the behavior and conversation of the passenger were "disorderly conduct," and warranted putting him off irrespective of the fare question.

The other case arose in Tennessee. The suit was brought by a colored woman, who complained that she had been by the conductor expelled from the ladies car and required to ride in the ordinary car. The conductor's excuse was that this was done, not at all on account of her color, but because she was "a notorious courtesan and addicted to immodest deportment in public places." Her counsel argued that the conductor had no right to expel her for any unfavorable rumors or suspicions about her, so long as she, on that trip and train, was behaving with propriety; he must wait until she was guilty of some improper conduct, breach of regulations, or refusal to pay fare, before he could act. The judge said that the reasonableness of the regulation excluding "improper persons" from a particular car is a question to be decided by a jury. Such a regulation may be reasonable under special circumstances. The circumstances must be shown, and the reasons explained, and a jury must decide whether the rule is a proper one.

Contributive negligence of passengers has been drawn in question in two cases, one in Pennsylvania, the other in Kentucky, involving the familiar matter of a passenger who might ride in the passenger car leaving it and riding by mere choice in the baggage car. In both cases the courts say that the companies have the right to forbid riding in the baggage cars or on the platforms, and that when they do so, a passenger who breaks the rule and is hurt in a collision cannot recover damages, if the circumstances show that he would not have been hurt if he had remained in his proper place in the passenger car. But the courts differ on the question whether leave given by the conductor makes any difference. The Pennsylvania Court holds that a conductor is not authorized to dispense with a public rule of the company, and permit passengers to ride in improper places at the company's risk. The Kentucky Court considers that the conductor is the general agent of the company in the management of the train and in administering the rules; and that distinct invitation or permission from him may give the passenger the right to ride in the baggage car.

In Pennsylvania a man got upon a street car, and, on account of the crowd being so great that there was not room inside, he, with several others, remained on the platform. At length the car was stopped for passengers to alight. At this point another car which was

following collided, through its driver's mismanagement and the breaking of its brake-chain, with the car in front, and the passenger on the platform of the car ahead was knocked down by the pole of the car in the rear, and he was badly hurt. The Court said, in effect, that it is doubtful whether passengers on street cars lose any rights by riding on platforms, unless they are warned and asked to go inside. Often there is no other place for them to ride. But, at any rate, a man's riding on the rear platform has no tendency to induce the driving of one car into another. In this instance the standing on the platform could not have contributed to the real fault, which was defective construction and reckless driving of the car in the rear. Therefore the passenger was allowed to recover.

A New York case decides that the rule requiring a railroad company to use the most approved apparatus, etc., does not apply in favor of a person who carelessly jumps from the steps of one train upon the track and is run over by another train. Under such circumstances, evidence that the injury might have been avoided if the train by which it was inflicted had been equipped with improved air-brakes in general use does not enable the injured person to recover.

THE WINTER GRAIN MOVEMENT.

Last winter was the first since 1873–74 when through rates on grain from the West to the seaboard had been maintained. In the latter part of that time a heavy winter grain movement to the seaboard had grown up, but at such extremely low rates as to leave hardly any difference in favor of the lake and canal rates when navigation was open, so that there was very little inducement for Western farmers and merchants to store grain through the winter. Therefore when the grain rate last winter was firmly maintained on the basis of 40 cents per 100 lbs. from Chicago to New York, it was a question whether such a rate, which was about twice as high as the average rate of the previous winter, would not arrest shipments and cause the grain to be held till the opening of navigation, as it used to be, and we made a special study of the movement at that time to ascertain the effect of the rate on the movement. It turned out that the winter movement was larger than ever before, in spite of the comparatively high rate, and that nearly as large a proportion of it as ever went by rail to the Eastern cities, in spite of the opening of the Mississippi route, by which water rates are secured for the winter as well as the summer.

It might be said, however, that the merchants and consumers, having been accustomed to low rail rates all winter for several years, made their arrangements accordingly, and so were compelled to forward grain largely in winter, in spite of the higher rail rates; but that as soon as they found that the railroads had determined in future to charge remunerative rates in winter they would return to their old practice of forwarding as much as possible in the fall while navigation was open, and then storing at lake ports and forwarding very little until navigation opened again in the spring.

The present winter ought to solve this question. The public had been taught, not only by last winter's experience, but by the maintenance of rates last summer, when it is especially difficult, that the railroads were not likely to carry for a trifle this winter, and all concerned probably made their arraugements on the supposition that the rate would not be lower than it has been. What has been the result?

The receipts and shipments of grain of all kinds at the Northwestern markets, St. Louis, Peoria, Chicago, Milwaukee, Detroit, Toledo and Cleveland, and the receipts at the seven Atlantic ports for the months of December and January, have been, in bushels, for the past eight years:

	——Northwestern.——		Atlantic.
	Receipts.	Shipments.	Receipts.
1873-74	26,325,261	12,010,012	17,85 ,573
1874-75	13,984,498	6,763,860	13,572,860
1875-76	20,913,672	9,295,360	15,838,748
1876-77	20,368,292	8,990,745	16,422,984
1877-78	23,395,040	13,536,554	28,555,582
1878-79	29,531,539	12 437,646	24,969,849
1879-80	34,022,151	10,743,373	28.823,286
1880-81	34,552,327	14,567,242	25,758,485

From this it appears that the Northwestern receipts were a little (4.6 per cent.) larger this winter than last, and much larger than in any earlier winter; the Northwestern shipments were 36 per cent. larger than last winter, and larger than ever before; and the Atlantic receipts smaller than last winter and in 1877–78, but larger than in any other. This movement ought to be satisfactory. The chief change from last year is the smaller excess of Atlantic receipts over the shipments of the Northwestern markets: it was 18.080,000 bushels last year and but 11.200,000 this, indicating considerably smaller shipments from interior points in the Northwest directly through to the seaboard.

The receipts of grain in these nine weeks at the several Atlantic ports has been as follows for the past five winters:

	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.
New York	5,724,566	11,413,141	10,029,271	11 999,441	9,814 262
Boston	1,575.6 7	2,182,413	2,02 ,851	2.621.318	4,027,821
Portland	301,213	4:2,4:6	318,012	8 8 614	5 9,972
Montreal	41,615	40,855	34,080	128,662	97,7 2
Philadelphia	3,47 7 200	5,731,2 5	5,1 3,225	3,7 2,810	3,972,5 0
Baltimore	4,867,100	6,205,5 0	5,8 3,800	6, 9,8 3	5,6 ,9 1
New Orleans	691,9.6	2,540,:92	1 58,225	3,871,949	1,655,293
Total	16,611,906	28 5 5,932	21,970,449	28,842,237	25,758,485

The total receipts for the two months, thus, have not varied greatly for four years. This year they were 10.7 per cent. *less* than last year, 3.1 per cent. *more* than in 1878–79, and nearly 10 per cent. *less* than in 1877–78. Only this winter and last were rates maintained (last winter a seventh higher than this). The other two winters rates began as high as 40 cents per 100 lbs. from Chicago to New York, but were demoralized gradually until towards the end of December and rapidly the rest of the winter. So far as appears from the receipts, then, the winter grain movement does not appear to have been much affected by the rates. Doubtless, however, the movement in the first two years would not have been so great as it was if the rates had been higher, and probably they would have been lighter this winter if last winter's 40 cent rate had been charged. The lower rate this winter is equivalent to about $1,300,000 smaller net earnings to the railroads east of Chicago and St. Louis.

There has been more change in the relative receipts of the different ports than in the totals. New York has received less this year than in any of the three preceding. It has not lost to New Orleans, however, nor even to Philadelphia and Baltimore, but to Boston, which has gained 54 per cent. over last year, while every other place except Philadelphia (which gained 18 per cent.) has lost. New Orleans has not received half as much as last winter and a third less than three winters ago, and its failure to increase while rail rates are so well maintained is likely to be interpreted as evidence that there is not much advantage in exporting by way of that port. If it is not very profitable to ship by that route when rail rates are 40 cents or 35 cents from Chicago to New York, it is not likely that it ever will be; and if great profits were made last year, when rail rates were at the highest point they are likely to reach, it seems strange that capital was not attracted into the business sufficient to greatly increase the shipments this winter.

The percentage of the aggregate receipts arriving at each port in December and January each winter has been, for five years:

	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.
New York	34.4	40.0	40.1	41.6	38.1
Boston	9.5	7.6	8.1	9.1	15.6
Portland	1.8	1.5	1.3	2.8	2.2
Montreal	0 2	0.2	0.1	0.4	0.4
Philadelphia	20.6	20.1	20.8	11.7	15.4
Baltimore	29.3	21.7	23.2	21.0	22.0
New Orleans	4.2	8.9	6.4	13.4	6.3
Total	100.0	100.0	100.0	100.0	100.0

New York, thus, has received a smaller proportion of the whole this year than before for three years; Philadelphia has a much larger percentage than last winter, but a much smaller one than in the other three years; Baltimore a little larger one than last winter, but a little smaller one than in 1878–79 and 1876–77; New Orleans a smaller one than in any of the three years next previous; while Boston has a much larger proportion than in any other year.

Comparing the percentages of New York with those of Philadelphia and Baltimore taken together, we have:

	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.
New York	34.4	40.0	40.1	41.6	38.1
Philadelphia and Baltimore	49 9	41.8	44.0	32.7	37.4
The three cities	84.3	81.8	84.1	74.3	75.5

Thus, in spite of the fact that New York's percentage this winter is the smallest for four years, that of the other two cities is, with the exception of last winter, the smallest of the five years.

If now we compare the percentages of New York and Boston taken together with those of Philadelphia and Baltimore taken together we have:

	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.
New York and Boston	43.9	47.6	48.2	50.7	53.7
Philadelphia and Baltimore	49.9	41.8	44.0	32.7	37.4
	93.8	89.4	92.2	83.4	91.1

This shows that the winter business of the two northern cities has been growing constantly. In 1876-77, the December and January receipts of the other two cities were considerably the largest; this winter they are 30 per cent. less than those of New York and Boston.

In fact, the one notable change visible this winter is the considerable gain at Boston in face of a general decline. To explain this we know of nothing else than that the Erie road has had a Boston connection this year and has been able to cultivate that business better than heretofore, and that the Grand Trunk, which carries to Boston chiefly in the winter, by having its own road to Chicago has been able to command a larger share of the business. These facts, however, may have nothing to do with Boston's increase. It is commonly supposed that a new line between two places, if it carries at the old rates, will get no traffic which it does not take from the previously existing routes, and there may be other reasons for Boston's exceptional increase. Moreover, these receipts are for two months only, and accidental circumstances may easily have a considerable effect for so short a period. Some circumstance, easy to recall, however, have been much more unfavorable to New York and Boston than to Philadelphia and Baltimore, namely, the snow blockades, which have considerably disturbed traffic on all the roads through Buffalo and further north.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

East Line & Red River.—Extended from Greenville, Tex., west to Sabine, 11 miles. Gauge, 3 feet.

International & Great Northern.—Extended from Davenport, Tex., southwest to San Antonio, 18 miles.

Atlantic & Pacific.—Extended from last year's terminus (seventy-eight miles west of Isleta, N. M.) westward 22 miles.

Pennsylvania.—Track on the *Pittsburgh, Virginia & Charleston Division* has been extended from Belle Vernon, Pa., southward to Brownsville, 12 miles.

This is a total of 63 miles of new railroad, making 173 reported thus far this year.

THE GRAIN MOVEMENT DOWN THE MISSISSIPPI seems to have made an impression altogether out of proportion to its bulk. A Western newspaper says:

"Jay Gould, with his usual sagacity, comprehends the situation, and, satisfied that the water route *via* St. Louis to Europe will be the grand route for the surplus products of the Mississippi valley, is just now putting himself in shape to handle it. He is buying up barge and steamboat lines, and getting ready to move the next crop. Over 18,000,000 bushels of wheat went down the river last season; this year there will be 100,000,000 bushels. Mr. Gould says he will be in shape to contract for delivering grain by this route in Liverpool, from St. Louis, at the same rates as from New York. This would give the farmer ten cents more a bushel for wheat, and an equal ratio on corn."

Whether what this says of Mr. Gould's plans and purposes is true or not we do not know. Mr. Gould has not confided his plans to us; but if he has based his plans on reports like these of the existing Mississippi River traffic, he has less "sagacity" than this paragraph credits him with. It is true that nearly 19,000,000 bushels of *grain* went down the Mississippi last year, but only a small part of it was wheat; and as for 100,000,000 bushels of wheat going down the river this year, that is probably about as much as the whole country, this side of California, will export, and surely it is not expected that New York, Boston, Philadelphia and Baltimore will abandon wheat-exporting entirely this year. Further, so far this year New Orleans has exported less and not more than last year, and in 1880, while it received about 6,800,000 bushels of grain of all kinds more than in 1879, New York received 8,900,000 bushels more: at which rate it will be some time before New Orleans gets most of the grain.

It is difficult to see how by any cheapening of transportation on the Mississippi the freight on grain to Liverpool can be made as low from St. Louis as from New York. When the grain gets to New Orleans it is a good deal further from Liverpool than when it started, and 1,500 miles further than New York is, with much more unfavorable navigation. It is true that rates by sea are by no means in proportion to distance; but when we come to examine the rates themselves we find that on cotton, the chief export of New Orleans, and that which supports its shipping, the rates quoted are usually *three or four times as great* as the rates from New York at the same time. The New Orleans grain rates we have never seen quoted. There cannot be the same difference in them, for if there was, grain could not be exported, and it is exported thence in considerable quantities. The question comes up, then, why the vessels accept rates lower in proportion on grain than on cotton from New Orleans. The only reply we have heard is that there is a certain amount of space in a vessel which cannot well be loaded with cotton, but can be with grain, and that *to fill the ships* the vessels are glad to get freight even at very low rates. But if this is true, then the carrying of grain from New Orleans at very low rates—at anything like the rates which pay from New York to Liverpool—must be limited to the amount needed to fill out cargoes of cotton; for vessels loading with grain alone will not go to New Orleans unless they can make as large profits as by carrying from New York or Baltimore, and they can not make a voyage one-half longer and more dangerous, with higher insurance, at the same cost as the New York-Liverpool voyage.

THE BESSEMER STEEL PRODUCTION OF THE UNITED STATES in 1880 is reported by Mr. James M. Swank, the Secretary of the American Steel and Iron Association to have been 1,074,262 tons of 2,240 lbs., which is 30 per cent. more than the production in 1879, 64 per cent. more than the 1878 production, 115 per cent. more than the 1877 production, 220 per cent. more than the 1875 production, and more than ten times as much as the 1872 production. Without any exception there has been an increase in the production from year to year—all through the dull times as well as since.

Of the production of ingots last year 819,280 tons of stee

rails were made—enough to lay 9,310 miles of track with 56 lbs. rails. In 1879 the production of steel rails was 610,870 tons. Besides the 819,280 tons reported for 1880, a considerable quantity—estimated at more than 40,000 tons—was rolled by iron rolling mills which purchased Bessemer blooms. The consumption of Bessemer steel for other purposes than rails seems to keep pace very nearly with the rail consumption and the total production, which is quite remarkable, as for a long time hardly any other use was proposed, and little is said about the other uses now. But last year the production of ingots was 270,000 tons more than the production of rails, and in 1879 218,957 tons more—a tremendous addition to the steel manufactures of the country other than rails. In the last three years the percentage of the production not contained in the rails (some of which is waste) has been about 25 per cent., and earlier it was a smaller proportion of the much smaller production.

The production during the current year will show a further large increase. There is one new works about to be opened (at Pittsburgh, especially to supply manufacturers who do not make rails), but the greater part of the increase will be due, doubtless, to improvements and enlargements of the old works, and to the working of the Vulcan Works at St. Louis throughout the year, while it was closed a fifth of last year. Besides the Pittsburgh works two other new establishments are under way, one in Chicago and one in Colorado, but these, though likely to be completed this year, will hardly have much effect on the production of the year.

THE OVERLAND COTTON MOVEMENT, which had been growing quite rapidly for several years, shows an important decrease during the present crop-year. The *Commercial and Financial Chronicle's* review for the five months of the crop-year from Sept. 1 to Feb. 1 shows 653,610 bales carried this year against 781,066 last, a decrease of 16 per cent. This is in spite of an increase from 3,768,011 to 4,025,800 bales, or nearly 7 per cent., in the total seaboard receipts. This is probably due in part to the fact that this year Memphis has been able to resume its place in the trade, while on account of the yellow fever prevailing there for two years previous its cotton business was driven away, and and largely to St. Louis and Cincinnati, whence the movement is by rail exclusively, while a large part of the Memphis cotton goes to market down the Mississippi by way of New Orleans. The decrease this year in shipments from St. Louis is 88,509 bales, or 28 per cent., and in those by way of Cairo 35,997 bales, or 30 per cent.; on those by way of Louisville, 59,358 bales, or 31 per cent., while the receipts at Cincinnati by way of the Ohio River have fallen off 45 per cent.; against which is to be set the 50,449 bales brought by Cincinnati Southern, which is credited with no part of the business last year.

By far the larger part of the crop is marketed in this part of the crop-year now expired, so that the extent to which the crop will differ from the previous years is approximately known. The *Chronicle* finds that the total amount marketed with that on hand at interior points, Feb. 1, was 4,772,452 bales this year, against 4,655,545 last, an increase of but 146,907 bales, or 3.2 per cent. It estimates that there was somewhat more in planters' hands this year than last at that date; but as the amount marketed in the first five months of the crop-year last year was five sixths of the whole, the movement of the remainder of the year is not likely to be very important to the carriers. Last year the movement was at the average rate of 210,252 bales per week before Feb. 1, and of 31,762 bales afterward—that is, on the average a day's business in that part of the crop year that is past is larger than a week's business in that part which is to come.

AN INDEX TO INVENTIONS AND DISCOVERIES, such as was proposed by the Commissioner of Patents thirty years ago and again in 1879, and which we took occasion to recommend in the first issue of this year, was contemplated by a bill introduced into the House of Representatives by Mr. Vance, in February of last year. This bill, which is entitled, "a bill to enable the Commissioner of Patents to prepare an index to the technical books in the Patent Office Library," appropriates $10,000 for the preparation of an alphabetical subject-matter index of the contents of the technical books, magazines and publications in the English language" in the library, to be made under the supervision of the Commissioner, who is authorized to employ some one "of experience in classifying and indexing," at not more than $2,500 a year, with the necessary assistants.

The bill, it appears, limits the indexing to the English publications, which will prevent its being complete or anything like it, but will be much the most important part of the work, and can be supplemented by indexing publications in foreign languages later. It is an objection to the bill, however, that it limits the salary to be paid to $2,500. Really competent persons of experience in classification and indexing technical literature are not so common. It requires a very superior kind of person to do such work as it should be done, and his services should be worth considerably more than $2,500 per year. We have not learned that any definite action has ever been taken with reference to this bill, but it is to be hoped that the different engineering societies in the country will use their influence in Congress to have the bill passed.

As the present session of Congress lasts but two weeks longer, it is probably too much to hope that anything can be done this season, and if not the bill will have to be introduced anew to the new Congress. This probably will be done if the influential societies, corporations, firms and individuals who know the need of such a work would take the trouble to let Congress know that they want it done.

NEW YORK, LAKE ERIE & WESTERN EARNINGS for December are reported 23.4 per cent. and its net earnings 42 per cent. greater than in 1879, and for the first three months of the corporation year an increase of 17.6 per cent. in gross and 31.1 per cent. in net earnings. The amount of the increase of the latter is $305,604, which is just about enough to pay the 6 per cent. dividend on the preferred stock. The increase in working expenses for the quarter is the moderate rate of less than 10 per cent. The great gain made by this company last year was chiefly after the first quarter, in which its gain in net earnings over the previous fiscal year was but $180,000 out of a total gain of $2,280,000 for the year. It is, therefore, not probable that the rate of increase of the first quarter of this year will be continued, though this road more than most others may gain in net earnings, by reason of its great improvements. The gross earnings, expenses and net earnings of the company for the quarter from October to December, inclusive, for the past four years have been:

	1877.	1878.	1879.	1880.
Gross earnings	$4,571,419	$4,061,678	$4,627,777	$5,424,036
Expenses	2,897,253	2,617,384	3,004,089	3,294,744
Net earnings	$1,674,166	$1,443,294	$1,623,688	$2,129,292

The increase in net earnings is thus 31 per cent. over 1879, 47½ per cent. over 1878, and 27¼ per cent. over 1877.

IMMIGRANT RATES FROM NEW YORK were suddenly restored last Monday, after a meeting on Saturday of the presidents of the three contending railroads. It has, naturally, been concluded from this fact that the presidents settled the difficulty; but we are informed that all they did was to agree to negotiate for a settlement, and that rates were restored because one of the companies refused even to negotiate until the rates had been restored. The work, therefore, all remained to be done when the rates were restored, but the agreement to negotiate makes a settlement possible. There have been some conferences on the subject since, but we do not know that any result has been reached yet. Meanwhile, the passenger arriving at Castle Garden pays $13 for a ticket to Chicago this week, against $3 last week.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Camden & Atlantic, annual meeting, at the office in Camden, N. J., Feb. 24, at 10 a. m.

Cleveland, Columbus, Cincinnati & Indianapolis, annual meeting, at the office in Cleveland, O., March 2.

Pennsylvania, annual meeting, at Musical Fund Hall, Philadelphia, March 8, at 11 a. m.

Foreclosure Sales.

The *Atlantic, Mississippi & Ohio* road was sold in Richmond, Va., Feb. 10, under foreclosure of the consolidated mortgage. A number of bids were made, and the road was finally sold for $8,650,000 to Clarence H. Clark, of Philadelphia, for himself and associates. The road extends from Norfolk, Va., to Bristol, 408 miles, with branches to City Point, 10 miles, and to Salt Works, 10 miles. The road was sold subject to divisional mortgages amounting to $5,230,675, and to about $200,000 other claims; the state of Virginia also has a lien for $4,000,000, which the Board of Public Works has voted to sell for $500,000, making the total cost to purchasers about $14,980,000. There were $5,470,000 consolidated bonds out, and the price paid for the road will be sufficient to pay those bonds and all overdue interest. It is understood that Mr. Clark represents parties who are largely interested in the Shenandoah Valley road, and have purchased this road in order to secure an outlet to the southwest for their line. The other parties bidding for the road were the representatives of the consolidated bondholders, who reside chiefly in England and Holland, and a syndicate representing the Richmond & Danville and other Southern lines. What effect the purchase will have on the relations and connections of the road is not very clear as yet, but it would seem to be the policy of the purchasers to cultivate friendly relations with all connecting lines. It had been understood for some time that arrangements were made, provided the road were bought by the bondholders, for placing it under substantially the same management as the East Tennessee, Virginia & Georgia road, making it part of a through line from Norfolk to Memphis, Selma and Vicksburg.

The Detroit & Bay City road was sold in Detroit, Feb. 12, under foreclosure of mortgage and bought for $3,625,750 by James McMullen and H. B. Ledyard, who are understood to represent Mr. W. H. Vanderbilt. The bonded debt, as fixed by the decree of foreclosure, was $2,678,487, and the accrued interest $866,886. The road extends from Detroit to Bay City, 110 miles, with branches to Saginaw, Five Lakes and Caro, making 148 miles in all. The sale will not make much change, as it has been run in the interest of the Michigan Central for some time.

American Institute of Mining Engineers.

The annual meeting of the Institute began at the rooms of the Franklin Institute, at Philadelphia, on the evening of Feb. 15, with over 100 members present and a large number of spectators. The meeting was called to order by the President, Mr. William P. Shinn, of Pittsburgh. After a few unimportant matters had been alluded to, Mr. Persifer Frazer, Chairman of the sub-committee on entertainments, introduced Hon. Wayne MacVeagh, who delivered a warm and eloquent address of welcome. This was responded to by the President, who, in the course of his remarks, reviewed the progress of industry in this country during the past five years, and showed what had been accomplished in the arts and sciences. The names of 61 gentlemen were presented for membership and 11 for associate members, and they were elected. Dr. Ottoway Moses, of Menlo Park, assistant to Mr. Edison, and a mining engineer, read a paper on "The Applicability of Edison's System of Electric Lighting to Mines." The paper was an interesting one, and Dr. Moses showed that Mr. Edison's light could be put into such a form that it would be perfectly safe in any atmosphere, no matter how explosive, and further that it could be kept burning in either alcohol or gunpowder without any danger. Dr. Moses exhibited 30 of Edison's famous horseshoe lamps of sixteen, eight and three-candle power. After the reading of the paper the members of the Institute proceeded to the rooms of the Penn Club, where they were received and entertained.

Western Association, General Passenger & Ticket Agents.

A called meeting of this Association was held in Cincinnati, Feb. 9, the business transacted being summed up as follows:

The matter of rates was not discussed, because they are so low between Chicago and St. Louis and Chicago and Kansas City that it is impossible to do anything definite.

It was agreed to make theatrical rates two cents per mile for companies of five or more—at least, that charge was agreed upon as a reasonable rate.

Every one concurred in a proposition to adopt uniformity in the color of coupon tickets. A committee was appointed in regard to this matter, and its report will come up at the next meeting of the Association. However, it was voted to try and confine coupon tickets to two classes, first and second.

A resolution was adopted to state, in advertisements in railway guides, etc., the actual number of the trains, instead of naming them by the terms of "New York Express," "Atlantic Express," etc.

It was voted that it was advisable for companies to sell their own tickets for local excursions, instead of leaving that matter to parties who charter trains—the determination being to put the tickets at low rates, so as to induce their purchase directly from the company rather than from intermediate parties.

As to reporting tickets to other roads, it was voted to put on the reports the through rates commencing and inclosing number; also the actual name of the station where the ticket is sold, as well as the destination, form and the proportion.

With regard to local round-trip tickets, it was decided, by a very large majority, to encourage the sale of such tickets, as being beneficial both to the roads and the public, the understanding being that round-trip tickets should be sold at a material reduction.

It was asked whether ticket agents should be paid a commission on local ticket sales. It was decided that the plan was not feasible.

It was decided to devote a certain space in the official railway guides to giving information regarding through cars, so that passengers can tell conveniently how they run.

A resolution was adopted regarding reporting excess baggage. The representative of one important line stated that upon investigation he had found, that in the four months ending Dec. 31, 21 roads had reported excess baggage to his company, and his line had reported excess baggage to 47 other roads.

A resolution was passed that the earnings from the mail and express business should be credited to the passenger instead of to the freight department, as mail and express matter was hauled by passenger trains.

It was intended to take up several questions relating to newspaper advertising, and the issuing of passes to newspaper men, but these matters were deferred until the next meeting, as several important roads were not represented at the meeting.

The next meeting of the Association will be held in May, in Cleveland.

ELECTIONS AND APPOINTMENTS.

American Society of Civil Engineers.—The following additions to the list of members are reported in the December *Transactions*, just issued: *Honorary Members.*—Sir John Hawkshaw, No. 33 Great George street, London, England; Emile Malézieux, Inspector-General Corps des Ponts et Chaussés, Paris, France. *Members.*—Lyman Bridges, Chief Engineer California Central Railway, No. 702 Market street, San Francisco; J. Foster Crowell, Chief Engineer Elizabeth City & Norfolk Railway, Elizabeth City, N. C.; Francis J. Palmer, No. 68 Wall street, New York.

Baltimore & Ohio.—Mr. J. L. Morrow has been appointed Train-Master of the Chicago Division, with office in Chicago.

The following changes in the Machinery Department (one or two of which we have already noted) were made during January: W. H. Harrison, Assistant Master of Machinery, promoted to be Master of Machinery of the lines west of the Ohio River; A. J. Cromwell, promoted to be Assistant Master of Machinery; I. N. Kalbaugh, transferred to Mount Clare (Baltimore) shops as Master Mechanic; Samuel Houston, transferred to Piedmont (W. Va.) shops as Master Mechanic.

Boston & Albany.—The Massachusetts Legislature has elected Francis B. Hayes, of Boston, and Theodore C Bates, of Worcester, state directors of this company. Mr. Hayes is re-elected; Mr. Bates succeeds Mahlon D. Spaulding.

Chicago & Alton.—Mr. S. D. Reeve has been appointed Assistant Superintendent of the Chicago Division, with office in Chicago. He has been for several years on the Chicago, Burlington & Quincy.

Chicago, Burlington & Quincy.—Mr. Samuel Crance has been appointed Train-Master of the Chicago Division, in place of S. D. Reeve, who has gone to the Chicago & Alton. Mr. Crance has been a conductor on the road.

Chicago, Rockford & Northern.—Mr. C. C. Jones, of Rockford, Ill., has been appointed Receiver.

Columbus & Hocking Valley.—Mr. J. B. Foley has been appointed General Agent for this road, the Columbus & Toledo and the Ohio & Western Virginia. He will have his office in Toledo, O., and will have special charge of the lumber traffic.

Columbus, Hope & Greensburg.—This company has elected officers as follows: President, Simon Stapp, Hope, Ind.; Vice-President, W. W. Hamilton, Greensburg, Ind.; Treasurer, B. B. Jones, Columbus, Ind.; Secretary, W. A. Moore.

Connecticut Railroad Commission.—The Governor of Connecticut has appointed John W. Bacon, of Danbury, Railroad Commissioner for a new term of three years. Mr. Bacon has already served one term.

Denver & Rio Grande.—Mr. C. W. Bradley has been appointed Master of Transportation, with office in Denver, Col. Mr. Bradley was formerly on the Wabash road.

Detroit, Lansing & Northern.—Mr. J. J. McVean has been appointed Chief Engineer, in place of Gen. M. T. Thomas, resigned. He has been Assistant Engineer for several years.

Ft. Smith & Great Northern.—The directors of this new company are: John Carnell, R. T. Kerr, Thomas Lanagin, Frank Park, E. F. Tiller. Office at Ft. Smith, Ark.

Kingston & Pembroke.—At the annual meeting in Kingston, Ont., Feb. 8, the following officers were chosen: C. F. Gildersleeve, President; G. W. Flower, Vice-President; George Osborne, Secretary and Treasurer; B. W. Folger, Superintendent.

Memphis & Little Rock.—At the annual meeting in Little Rock, Feb. 15, the following directors were chosen: B. C. Brown, R. A. Edgerton, Little Rock, Ark.; B. C. Black, Brinkley, Ark.; H. G. Marquand, D. W. Williams, New York. The board elected H. G. Marquand, President; E.

K. Sibley, General Manager; J. W. Goodwin, Secretary and Treasurer.

Michigan Central.—Mr. R. H. L'Hommedieu, late of the Grand River Valley Division, has been appointed Superintendent of the Western Division.

Minneapolis, Lyndale & Minnetonka.—The officers of this company are: President, Wm. McCrory; General Passenger Agent, R. S. Innes; Treasurer, S. E. Neiler.

Natchez, Red River & Texas.—The officers of this new company are: President, H. R. Steele; Vice-President, W. T. Martin. Office at Vidalia, La.

Newport & Wickford.—At the annual meeting last week the following directors were chosen: S. P. Vaughn, Wickford, R. I.; John G Weaver, John N. A. Griswold, Newport, R. I.; George M. Miller, George Peabody Wetmore, Levi P. Morton, New York. The board elected George M. Miller, President; Anthony S. Sherman, Treasurer.

Pennsylvania.—Mr. Wm. Thaw, of Pittsburgh, has been chosen a director in place of Josiah Bacon, deceased. Mr. Thaw is a large stockholder, and has long been an officer and director of the Pennsylvania Company.

Mr. S. M. Prevost, Superintendent of the Middle Division, is acting as Superintendent of the Philadelphia Division also, for the present.

Philadelphia & Erie.—At the annual meeting in Philadelphia, Feb. 14, the following directors were chosen: J. N. DuBarry, W. I. Elkins, Wm. J. Howard, Strickland Kneass, Wistar Morris, Henry M. Phillips, N. Parker Shortridge, Samuel Gustine Thompson, Henry D. Welsh, John Price Wetherill. The road is leased to the Pennsylvania Railroad Company.

Pittsfield & North Adams.—At the annual meeting in Boston, last week, the following directors were chosen: Frank H. Appleton, Chester W. Chapin, Henry Colt, Edward Jackson, Ignatius Sargent, Jr. The board elected Henry Colt, President. The road is leased to the Boston & Albany.

Providence & Worcester.—The board has re-elected George A. Leete, President; John R. Balch, Treasurer; Wm. E. Chamberlain, Superintendent.

Quebec & Lake St. John.—At the annual meeting in Quebec, Feb. 3, the following directors were chosen: M. W. Baby, J. D. Brousseau, T. LeDroit, T. A. Peddington, S. Peters, D. A. Ross, Frank Ross, R. P. Vallee. The board elected T. LeDroit, President; J. D. Brousseau, Vice-President.

St. Joseph Valley.—At the annual meeting, held Feb. 8, the following directors were chosen: Wm. R. Rough, Wm. Pears, Geo. H. Richards, R. D. Dix, George H. Murdock, J. H. Matthews, L. P. Fox. The board elected officers as follows: President, Wm. R. Rough, Buchanan, Mich.; Vice-President, R D. Dix, Berrien Springs, Mich.; Secretary, George H. Murdoch, Berrien Springs, Mich.; Treasurer, Wm. Pears, Buchanan, Mich. There is no change from last year.

St. Louis Association of General Passenger and Ticket Agents.—At a recent meeting the following officers were elected for the ensuing year: President, F. Chandler, Missouri Pacific; Vice-President, H. B. Blood, St. Louis, Keokuk & Northwestern; Secretary, George H. Daniels, Wabash, St. Louis & Pacific; Executive Committee, A. J. Smith, Cleveland, Columbus, Cincinnati & Indianapolis; C. S. Cone, Jr., Ohio & Mississippi, and D. Wishart, St. Louis & San Francisco.

Southeastern, of Canada.—Mr. A. G. Eastman is appointed Master Mechanic, in place of E. C. Goss, resigned. Mr. Eastman was formerly on the Canada Central.

Toledo, Cincinnati & St. Louis.—The directors of this new company are as follows: Geo. Wm. Ballou, Eli Moroin, C. H. Vennor, W. J. Craig, John M. Corse, W. H. Hart and William H. Bingham.

United New Jersey.—The New Jersey Legislature has re-elected Charles A. Butts, of Burlington, state director in this company.

Wabash, St. Louis & Pacific.—Mr. E. N. Armstrong has been appointed Assistant Superintendent of the Iowa Division, with office at Keokuk, Ia. Mr. Armstrong was on the old Toledo, Peoria & Warsaw for eight years as operator, train-dispatcher and lastly Train-Master, which position he retained when the road passed to the Wabash.

Western Association, General Passenger & Ticket Agents.—At the Cincinnati meeting last week the following officers were chosen: President, James R. Wood, Chicago, Burlington & Quincy; Vice-President, Samuel Stevenson, Cincinnati, Hamilton & Dayton; Secretary, George H. Daniels, Wabash, St. Louis & Pacific; Executive Committee, James Charlton, C. H. Rockwell, H. R. Deering, O. W. Ruggles, J. W. Carey; Board of Arbitration, S. Stevenson, C. S. Cone, Jr., John Eagan.

West Jersey.—Mr. Joseph H. Reynolds has been chosen Assistant General Freight Agent. He will continue in charge of the express business of the road, which he has managed for some time.

PERSONAL.

—Mr. Wm. F. Lockard, Superintendent of the Philadelphia Division, Pennsylvania Railroad, has received leave of absence on account of ill health.

—It is reported that Mr. Charles F. Hatch has resigned his position as General Manager of the Minneapolis & St. Louis road to take charge of an important Western line.

—Mr. W. S. Hill has resigned his position as Assistant Superintendent of the Peoria & Iowa Division of the Wabash, St. Louis & Pacific road. He has been on the road for several years, under several changes of management.

—Gen. Robert Thomson, for seven years past President of the Philadelphia & Erie Company, died at his residence in Philadelphia, Feb. 13, aged 53 years, from kidney disease contracted while in the army. Gen. Thomson was an old Philadelphian and served with credit during the war.

—Hon. Francis H. Dewey has resigned his position as Judge of the Massachusetts Superior Court. Judge Dewey is President of the Norwich & Worcester Company, a director of the Worcester & Nashua and a director of the Washburn & Moen Manufacturing Company. He intends to devote his time to his private business.

—Gen. M. T. Thomas, for several years Chief Engineer of the Detroit, Lansing & Northern road, has resigned on account of his health, intending to seek a more favorable climate. The officers and employés, on the occasion of his retirement, presented Gen. Thomas with a purse of $300, and Mrs. Thomas with a valuable silver set.

—Mrs. Ellen Edwards Corse, wife of Major-General John M. Corse, President of the Toledo, Delphos & Burlington Company, and daughter of James E. Edwards, founder of the Burlington *Hawkeye*, died recently at Burlington, Ia. Mrs. Corse was widely known in New York and Boston, being a member of the Woman's Club in the latter city.

—Mr. Seymour Howell, Division Freight Agent of the Wabash, St. Louis & Pacific road and formerly General Freight Agent of the Eel River road, has resigned to accept the position of Assistant Manager of the Peninsular Car Works. He will take charge of the branch shops at Adrian, Mich., March 1. He leaves many friends who regret his departure from the road.

—Mr. Alexander Devine, late Chief Clerk to the Superintendent of the Prince Edward Island Railway, has resigned, to take a position in the office of the Superintendent of the Chicago & Grand Trunk road, at Battle Creek, Mich. Before leaving his old post Mr. Devine was entertained at a public dinner by a large number of friends, and presented with a handsome gold chain and locket by the employés of the road.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Dec. 31:	1880.	1879.	Inc. or Dec.	P. c.
Atlantic, Miss. & Ohio	$2,064,194	$1,749,616	I. $314,578	18.1
Net earnings	996,508	762,878	I. 203,630	26.0
Chesapeake & Ohio	2,674,308	1,936,539	I. 737,769	38.7
Net earnings	544,923	439,220	I. 105,703	24.7
Des Moines & Fort Dodge	324,725	225,403	I. 99,322	44.1
Net earnings	143,921	84,072	I. 59,849	71.2
Louisville & Nash.	9,455,259	6,007,386	I. 3,447,873	56.8
Net earnings	3,858,613	2,590,327	I. 1,268 286	49.2
N. Y. & New England	2,396,302	.....	.....	.....
Net earnings	751,825	.....	.....	.....
Paducah & E'town	404,903	341,718	I. 63,185	18 6
Net earnings	103,043	83,195	I. 19,848	23.9
St. L., Iron Mt. & So.	6,265,597	5,292,611	I. 972,986	18.4
Net earnings	2,190,371	2,300,555	D. 110,184	4.8
Month of January:	1881.	1880.		
Cairo & St. Louis	$33,637	$22,821	I. $10,816	47.4
Ill. Cen., Ill. lines	477,799	467,449	I. 10,350	2.2
Iowa lines	122,673	127,184	D. 4,511	3.6
Ind., Decatur & Springfield	40,279	.....	.....	.....
Little Rock & Fort Smith	55,800	49,800	I. 6,000	12.0
First week in February:				
Chi. & Eastern Ill.	$29,746	$19,307	I. $10,439	54.9
Chi., Mil. & St. Paul	177,000	180,867	D. 3,867	2.1
D nver & R. G	76,103	26,246	I. 49,857	191.7
Northern Pacific	23,216	19,315	I. 3,901	20.2
St. L., Iron Mt. & So.	166,520	131,608	I. 34,912	26.
St. P., Minn. & Man.	34,500	29,300	I. 5,200	17.7
Week ending Feb. 5:				
Grand Trunk	$167.935	$174,441	D. $6,506	3.

Grain Movement.

For the week ending Feb. 5 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past eight years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1874	2,912,288	1,876,452	1,838,141
1875	1,345,598	936,011	1,553,001
1876	2,524,775	1,101,721	1,730,545
1877	1,477,302	970,548	1,975,509
1878	2,699,954	2,405,538	3,680,912
1879	2,863,091	1,681,013	3,926,153
1880	2,999,037	1,431,079	1,842,321
1881	3,050,080	1,632,348	2,149,442

Thus in everything the movement was larger this year than in the corresponding week of last year, but in all but Northwestern receipts smaller than in the corresponding week of 1879 and 1878.

Compared with previous weeks, the Northwestern receipts are 7 per cent. less than the week before, but with that exception the largest for six weeks; Northwestern shipments were a trifle less than the week before, and with one exception the smallest for seven weeks; Atlantic receipts were nearly 20 per cent. less than the week before and were the smallest for three weeks.

Of the Northwestern receipts Chicago had 44.4 per cent., St. Louis 20, Toledo 10.8, Peoria 10.1, Milwaukee 7.9, Cleveland 3 8 and Detroit 3 per cent. Only about a fifth of the receipts were wheat.

Of the Atlantic receipts, New York had 24.1 per cent., Baltimore 23.7, Boston 16.7, New Orleans 15.3, Philadelphia 15.2, Portland 4.1 and Montreal 0.9 per cent. The New York receipts were as small only twice in the whole year 1880—in the last two weeks of January. They were, too, nearly 40 per cent. less than the previous week, while no where else, except at New Orleans, was there any considerable decrease.

Exports from Atlantic ports for five successive weeks have been:

	Week ending—				
	Feb. 9.	Feb. 2.	Jan. 26.	Jan. 19.	Jan. 12.
Flour, bbls.	89,284	123,920	147,994	131,278	189,310
Grain, bush.	2,194,050	2,029,828	2,101,331	1,623,952	1,800,826

The flour movement the last week was especially light.

Receipts at Chicago and Milwaukee for the week ending Feb. 11 were as follows:

	Receipts.		Shipments.	
	1881.	1880.	1881.	1880.
Chicago	1,077,433	1,297,606	1,058,403	638,666
Milwaukee	201,536	242,200	82,108	62,300

This is a decrease of 17 per cent. in receipts and an increase of 66 per cent. in shipments at Chicago, and a decrease of 17 per cent. in receipts and an increase of 32 per cent. in shipments at Milwaukee.

San Francisco wheat exports by sea in January were 3,025,320 bushels. For the seven months of the California crop-year, from July 1 to Jan. 31, the exports were as follows, flour reduced to wheat in the totals:

	1880-81.	1879-80.	Inc. or Dec.	P.c.
Flour, barrels	350,154	281,447	I. 68,707	24.4
Wheat, bushels	12,851,563	13,640,793	D. 789,230	5.8
Total, bushels	14,602,333	15,048,028	D. 445.695	3.0

Very nearly all the wheat went to Great Britain. Of the flour about one-third went to Great Britain, one-third to China, one-sixth to Central America, and the rest to Japan, Mexico and the Pacific islands.

For the seven months exports of barley by sea were, in centals: 1880-81, 467,482; 1879-80, 420,404; increase, 48,078 centals, or 11.2 per cent. Some barley also goes east by rail.

Coal Movement.

Coal tonnages for the week ending Feb. 5 are reported as follows:

	1881.	1880.	Inc. or Dec.	P.c.
Anthracite	386,269	301,712	I. 84,557	28.1
Semi-bituminous	55,051	88,825	D. 33,774	37 9
Bituminous, Penna	52,181	44,369	I. 7,812	17 7
Coke, Pennsylvania	26,780	51,650	D. 24,870	47.8

The universal complaint of the coal shippers in Pennsylvania is the difficulty of getting cars enough.

The coal tonnage of the Pennsylvania Railroad in January was as follows:

	Tons.
Anthracite	116,381
Semi-bituminous	168,104
Bituminous	172 8 9
Coke	194,854
Total	652,158

Chicago coal receipts in January, all, of course, by rail, were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Anthracite	44,150	65,076	D. 20,026	32 2
Bituminous	179,709	149,800	I. 29,009	19.9
Total	223,859	214,876	I. 8,983	4.2

Shipments for the month were 61,126 tons, a decrease of 9,619 tons, or 13.6 per cent. from last year.

Petroleum Exports.

The report of the Bureau of Statistics shows slightly different figures for petroleum than those we copied recently from the *Produce Exchange Weekly*. The government statistics show the exports smaller in 1880 and larger in 1879 than those we published, making the decrease in 1880 77,930,323 gallons, and 18.3 per cent., instead of 58,836,095 gallons, and 14.4 per cent. The government figures also show a decrease of 86.8 per cent. in December. The value of the exports for the year did not decrease as much as the quantity—8 per cent. against 18.3—showing an increase in the average value per gallon from 11 4 to 10.0 cents per gallon. Of the total December exports it reports 86 per cent. to have been made from New York, and 11.3 per cent. from Philadelphia, and scarcely any from Baltimore.

Post-Office Express in England.

An English journal says:

"From the able speech of the Right Hon. H. Fawcett, the Postmaster-General, to his constituents at Hackney, it appears that the railway companies are about 'to virtually enter into a partnership' with the post-office authorities for the parcel post business. Under the plan proposed there will be two parcel stamps for packages of different weights, and at stated periods a fixed portion of the entire receipts will be handed over to the railway companies, who will merely convey the parcels collected by and distributed from the post-offices. This is a simple and satisfactory arrangement under the circumstances, but we cannot but think the railway companies lose by it a share of those profits which they might have secured entirely for themselves had they met with more energy and foresight the growing demands which have been made upon them for some time past for increased facilities in the carriage of small parcels."

Prospects for Lake Freights.

The Toronto *Evening Globe* of Feb. 7 says:

"Although navigation will not open for some time yet, business is already being done as to the regulation of freight rates. It is considered certain by those who ought to know, that all kinds of freights will be better for vessel-men this year. Timber freights from the upper lakes will be 35 per cent. better than last year. Coarse freights are offering in such quantities that rates will be sure to be higher than last season. Lumber freights, it is judged, will be 20 per cent. higher than they were during the greater part of last year at least. And it is thought that grain freights will open higher than they did last spring. Charters have already been made to carry fourteen cargoes of oak timber from Canadian ports on Lake Erie to Kingston, at $87.50 per 1,000 cubic feet, and one charter at $90 per 1,000. Charters have been made to carry oak timber from Bay City to Kingston at $120 per 1,000, and it is reported that another charter has been made at $135. Vessel owners are asking $150 per 1,000 on wanev pine from Lake Superior, but no charter is reported at that rate."

The opening rates by lake are a matter of great interest to the railroads, as they will go far to determine the rates which the railroads can command, not only after navigation opens, but for a month or six weeks before.

Overland Cotton Movement.

A comparative statement of the overland movement for the five months of the crop year from Sept. 1 to Feb. 1 is given in the *Commercial and Financial Chronicle* as follows (in bales):

	1880-81.	1879-80.	Inc. or Dec.	P.c.
From St. Louis	224,943	313,452	D. 88.5 9	28.2
Over Illinois Central	30,774	45,111	D. 14,337	31.8
Over Cairo & Vincennes	52,423	74,082	D. 21,659	29.2
Over Miss. River above St. Louis	98,331	86,903	I. 11,428	13.1
Over Evansville & Terre Haute	15,487	27,262	D. 4,775	23.6
Over Jeff., Mad. & Ind	62,784	84,545	D. 21,761	25.8
Over Ohio & Miss. Branch	36,888	61,229	D. 24.341	39.8
Over Louisville, Cin. & Lex.	35,545	46,801	D. 13,256	29.0
Cincinnati receipts by Ohio River	21,307	38,606	D. 17,299	44.6
Cincinnati receipts by Cin. South	50,449	.....	I. 50,449	....
Over other routes	18,135	232	I. 17.903	.....
Shipped to mills otherwise	8,554	9,843	D. 1.289	13.4
Total	653,610	781,066	D. 127,456	16.3

The decrease is almost universal, and is surprisingly regular. The exceptions are the increase in the movement by points north of St. Louis, which must be confined pretty much to what the Missouri, Kansas & Texas brings from Texas, and to the deliveries by the Cincinnati Southern.

Chicago Shipments Eastward.

The through shipments east at Chicago by the several lines in the pool for the week ending Feb. 12, were as follows by the several lines.

	Flour, bbls.	Grain, tons.	Provisions, tons.	Total, tons.	P. c. of Total.
Michigan Central	13,465	6,546	2,109	10,0 0	2.2
Lake Shore	25,280	9,533	3,865	15,955	32.3
Fort Wayne	30,064	2,644	5,923	11.633	24.5
Pan-Handle	12,115	975	3,617	5,892	11.7
Baltimore & Ohio	3,174	1,762	1,194	2,772	5.6
Grand Trunk	3,872	2,126	774	3, 7	6.7
Total	88.570	23,116	17,482	49,449	100.0

For eight successive weeks the shipments have been:

Week ending	Tons.	Week ending	Tons.
Dec. 18	45,667	Jan. 22	51,075
" 25	51,396	" 29	54,689
Jan. 1	41,807	Feb. 5	51,170
" 8	49,367	" 12	49,449
" 15	54,935		

The total shipments for these nine weeks were 449,555 tons, an average of 49.950 tons per week, and the variations from week to week have been remarkably small, especially when we take into account the snow blockades that have sometimes disturbed traffic.

Southwestern Passenger Troubles.

A dispatch from Chicago, Feb. 15, says: "At a meeting of the managers of the Southwestern railroad lines here today, the committee on a pooling plan submitted a report, giving shares to the different roads on passenger traffic to

points on the Missouri and beyond. The report met with opposition on account of the percentages given to several roads, and a difficulty arose over the number of unlimited tickets sold by the Wabash road during the recent war in rates. The Wabash people declined to give the figures until the pool was established, and the representatives of the other lines refused to agree to the terms of the pool until they knew the number of tickets the Wabash had sold. Neither party would give in, and the result was that the report of the committee was not agreed to, and the matter is left in *statu quo*."

A later dispatch from Chicago, Feb. 16, says: "The Southwestern passenger agents having failed yesterday to reach an agreement by which passenger business should be pooled, the Chicago, Rock Island & Pacific Company to-day announced that it would withdraw from the Western Trunk Line Association and that hereafter its dealings with ticket agents throughout the country will be direct, and not through the commissioner of that association. This may be the beginning of another railroad war."

Immigrant Rates.

The long fight between the trunk lines on immigrnt fares from New York has been ended by a conference of representatives of the different companies. It was agreed that from Feb. 15 rates should be restored to the old figures, the basis being $13 from New York to Chicago.

THE SCRAP HEAP.

Locomotive Building.

An American locomotive of the most usual size, say 16 or 17 by 24 in. cylinders and 5 ft. drivers, such as could be had less than ten years ago for $7,000 or less now commands $10,500, and very generally the works will not contract to deliver before 1882.

The Grant Locomotive Works, at Paterson, N. J., have orders for 25 locomotives for the Lake Shore & Michigan Southern road.

Besides those at Chicago and St. Louis already noted, new locomotive works are projected at Indianapolis, Detroit, Cleveland, Wilmington and Chattanooga. Possibly some of these projects may succeed in establishing themselves.

One locomotive was included in the exports from New York to Mexico last week; also 1,804 packages railroad material.

Car Notes.

The Central Vermont shops at St. Albans, Vt., are turning out five new box cars a week. Those now built all have iron trucks.

The Philadelphia & Reading shops in Reading, Pa., are now working full time, and a full force is employed.

The Lobdell Car Wheel Co., at Wilmington, Del., has recently bought a tract of 200 acres of land on the south side of the Christiana, for the purpose of extending its works.

The Lehigh Car & Manufacturing Co., at Stemton, Pa., is turning out 16 gondolas a day, and has several large orders ahead for freight cars.

The Peninsular Car Co. has its shops busy both at Detroit and at Adrian, Mich. At Adrian a number of coal cars 30 ft. long and 9 ft. wide are being built, and also a number of box cars.

F. W. Eames was chosen President of the Eames Vacuum Brake Co., in Watertown, N. Y., Feb. 14; Charles D. Bingham, Secretary and Treasurer, and F. W. Eames, Superintendent. Elisha D. Eames, of the company, returned from Brazil recently. He obtained some contracts amounting to over $10 000 there.

McKee & Fuller, at Fullerton, Pa., have contracts for 200 box cars for the Commercial Express; 300 gondolas for the New York, Pennsylvania & Ohio, and 1,000 coal cars for the Lehigh Valley road.

A forge for the manufacture of car axles is to started at Atglen, in Chester County, Pa. The works are to be large.

Bridge Notes.

The Clinton Bridge Co., at Clinton, Ia., is building several new bridges for the Dubuque Division of the Chicago, Milwaukee & St. Paul; 600 ft. of combination truss bridge for the Minneapolis & St. Louis; two spans, 150 ft. each, combination truss, for the Chicago, Pekin & Southwestern; 300 ft. of highway bridge for Clinton County, Ia.; 150 ft. of highway bridge for Marshall County, Ia., and several turn-tables.

The Detroit Bridge & Iron Works have lately completed an iron bridge of two spans, 165 ft. each, over Grand River, for the Detroit, Lansing & Northern road, and several small iron plate-girder bridges for the same road.

Iron and Manufacturing Notes.

The following circular is dated at Harrisburg, Pa., Feb. 8: "By authority of the Court of Common Pleas of Dauphin County, the name of the Jackson Manufacturing Co. has been changed to the Interlocking Switch and Signal Co. The business will be conducted as formerly, the name having been changed to better suit the nature of our business."

The Penfield Block Works of Mr. H. Tarbox & Co., in Lockport, N. Y., report an active business. They have lately taken an order for a quantity of their improved wrought-iron blocks with their new phosphor-bronze, self-lubricating bushings for the Port Royal & Augusta road.

The rail mill of the Rome Iron Works, at Rome, N. Y., has been refitted and will soon begin work rolling rails from steel blooms.

There are now at work in Joliet, Ill., no less than six factories of barbed wire fence, and several of these are soon to be enlarged, being now unable to meet the demand.

Several iron mines in Hastings County, Ont., are now owned by firms in the United States, and a good deal of ore is being mined and sent across the line. A large mine at Black Lake, Ont., near the Kingston & Pembroke road, is also worked by the Bethlehem Iron Co.

The Albany & Rensselaer Iron & Steel Co., at Troy, N. Y., is to make 15,000 tons of steel rails for the New York Central & Hudson River road.

The Pottstown Iron Co., at Pottstown, Pa., is about to build a new mill to make iron pipe.

Isabella Furnace, at Barnestown, Chester County, Pa., is running steadily on charcoal pig-iron for car wheels.

The E. & G. Brooke Iron Co. has blown out Hampton Furnace, near Birdsboro, Pa., on account of scarcity of charcoal.

Ashland Furnace, at Ashland, Ky., is running steadily with coal as fuel.

A company known as Powell's Iron Works has been incorporated at Chattanooga, Tenn., as successor to the Vulcan Iron & Nail Works.

The Lookout Rolling Mill, at Chattanooga, Tenn., is running steadily on iron rails and merchant bar.

Rockwood Furnace, in Roane County, Tenn., is receiving a new blowing engine and other improvements.

The Johnstown (Pa.) *Tribune*, of Feb. 1, says of the work done in the Bessemer steel department of the Cambria Iron Works: "The product of Cambria's two 6½ ton converters last week (141 hours) was 504 heats of steel, weighing 3,318 gross tons. The largest *actual* 24 hours' work was 90 heats, weighing 595 gross tons. For the month of January there were 2,025 heats made, weighing 13,347 gross tons. For the last twelve months there were 19,612 heats made, weighing 126,194 tons." These results, it is claimed, surpass the best work which has thus far been reported.

The Rail Market.

Steel rails are steady and a little higher. About $62 50 per ton at mill is asked for short deliveries and $60 for orders to come in later. Sales of English rails at $62.50 from store are reported. A sale of German rails is also reported at $65 delivered in New Orleans.

Iron rails show little change and few large sales are reported. Many small lots have been sold, however, at from $48 per ton at mill for heavy sections to $51 for light rails.

Old iron rails are weak, with a very dull market. Prices nominal at $28 to $30 per ton in Philadelphia.

Proposals for Iron.

Proposals will be received at Dover, N. J., until March 3, by F. H. Parker, Major of Ordnance, commanding the Picatinny powder depot, for furnishing and delivering at Port Oram, Morris County, N. J., the necessary iron work for a magazine building, consisting of about 122,805 lbs. wrought-iron beams, rods, bars, angles, channel, and plate, with the necessary bolts, washers, and pins, and about 26,7 2 lbs. iron castings. Proposals for either or both classes of the iron above mentioned will be received.

Sleepers.

The Cincinnati *Commercial* says: "If we could use the power of the state for the bettering of sleeping car accommodation, we would enact that each car should contain twelve thermometers conspicuously placed, each marked from 64° to 69° with a red line, and that the porter who permitted the average temperature of the car to fall below the lower figure or rise above the other, should be put to death."

A Vermont man in a sleeping car was accosted by his neighbor opposite, who was also putting on his shoes, with the inquiry: "My friend, be you a rich man?" The Vermonter looked astonished, but answered the pleasant-faced, tired-looking gentleman with a "Yes, I'm tolerably rich." A pause occurred, and then came another question: "How rich be you?" He answered, "About $700,000 or $800,000. Why?" "Well," said the old man, "if I were as rich as you say you be, and snored as loud as I know you do, I would hire a whole sleeping-car every time I traveled."—*Boston Globe.*

A Lost Car.

Within our recollection, what is now train 12 was called the Steamboat Express, and when it reached Deposit it generally took on a number of freight cars to fill out its complement for a train. Conductor Willits, popularly known as "Skaneateles," ran the train 18 years ago. One night the train broke in two west of Lordville. There was nothing strange about this. The cars were coupled, and in due time arrived in Port Jervis.

An examination of the way-bills showed that one car was missing. Willits was asked about it. Yes, he switched it on at Deposit, but on looking over the train after its arrival here he could not find it. That was strange enough! How could a car get out of a train and no one know of it?

It was concluded, however, that the car must be somewhere between Port Jervis and Deposit. An engine was sent up the division on an exploring expedition. Nothing was discovered until it had passed Lordville, when a car was discovered tumbled down the bank. *It was the lost car.*

Putting this and that together, the railroad men readily came to the conclusion that the car had broken its couplings, and had been pushed off the track, and with the impetus had been hurled over the bank, where it was found not badly damaged. When the train was discovered broken in two it was not suspected that a car had left the track, and so the train was coupled and came on to Port Jervis.—*Port Jervis (N. Y.) Gazette.*

A Turn-table set up in Twelve Hours.

In replacing a round-house turn-table, there is but one safe course to adopt, namely, to empty the house of all engines which may be called on for service. This, however, is to expose these valuable monsters to the cold, unless they have proper care; an additional reason for getting in the new table at the earliest possible moment. The repair shops of the Pennsylvania Railroad at West Philadelphia recently completed this little job in about twelve hours, although the centre box of the new table weighed five tons. The celerity with which the work was done, was due, aside from good management, to a steam crane made by the Appleby Bros., of London, and one of four exhibited at the Centennial of 1876. The crane is mounted on an iron car, and lifts, turns round, alters radius of jib and moves itself along the track by its own steam-power. It came into the hands of the Pennsylvania Railroad Company after being used in building the elevated railroad, where it proved of great service.

The Use of Elephants in Railroading.

The Bridgeport (Conn.) *Standard* of Jan. 11 says: "This morning Mr. B. Soules went out to the show buildings with the engine B. Soules and two of the drawing-room cars which had been painted up at New Haven. Leaving the cars on the main track the engine ran down to the switch to haul out a couple of empty cars. There was so much ice that the engine lifted from the rails and could not move. Two big elephants, Gipsey and Prince, were brought from the buildings, and as the engine had no cow-catcher, they placed their heads against the cross beam and made an ineffectual attempt to push it. The engine was letting off steam and the sparks were flying underneath, but the elephants worked away undismayed by the confusion. Finding they could not start the engine an empty car was brought out and the elephants pushed it against the engine several times and succeeded in starting it on to the rails. In the meantime Mr. Soules had returned to the yard and taken the engine Ansonia down with a red flag. When he arrived and found the engine on the track again he was amazed and no wonder. The down freight was delayed a little while by the accident. Those who saw the elephants butting the engine on to the track describe the scene as very funny."

The Telephone on Railroads.

According to *Engineering*, the Edison loud-speaking telephone is giving way in England before the Gower-Bell telephone. This latter form is largely used in the post office, and is also employed to some extent in railway signaling. In a recent experiment on the Southwestern Railroad, the telephones were simply connected between the existing wire for working the "block" system and the "earth." Conversation was then distinctly carried on, without interfering in the least with the ordinary signals; and it was curious to listen in the telephone, and hear the sound of the train itself leaving the distant station simultaneously with the strokes of the signal bell indicating its departure. The reason of this simultaneous working is, that the magneto-electric telephone currents, being of very weak strength and vibratory in character, are harmlessly superposed upon the powerful battery currents working the "block" instruments.

OLD AND NEW ROADS.

Ashtabula & Pittsburgh.—It is said that the Pennsylvania Company, lessee of this road, is having surveys made for a line from this road near Girard by Austintown to Ravenna, O., where it will connect with the Cleveland & Pittsburgh. The new line would shorten the distance between Cleveland and Pittsburgh, and would open up some good coal lands.

Atlantic & Pacific.—Track is now laid for 100 miles westward from the junction with the Atchison, Topeka & Santa Fe at Isleta, N. M. A regular train runs to the terminal station, which is now 80 miles out.

Baton Rouge & Ponchatoula.—An effort is being made to build a railroad from Baton Rouge, La., east to Ponchatoula on the Chicago, St. Louis & New Orleans. The route was surveyed some years ago, and the distance is 43 miles, over an easy country.

Blairstown.—A survey has been made for an extension of this road from Blairstown, N. J., by Stillwater to Newtown, about 14 miles. Mr. John I. Blair purposes building the road, provided the right of way is given by the people along the line.

Boston, New York & Western.—This company has been organized by Gen. Burt, of Boston, and others, and has, it is said, secured the controlling interest in the Boston, Hoosac Tunnel & Western road, which Gen. Burt sold some time ago. The object of the new company is to complete an independent line from the Hoosac Tunnel to Utica, Syracuse, and Rochester, securing connections with the Rochester & State Line and the Buffalo, Pittsburgh & Western roads.

Boston, Revere Beach & Lynn.—It is reported that a large amount of the stock of this company has been bought lately in the interest of the Eastern Railroad Company. It is also reported that propositions for a lease of the road to the Eastern Company have been made and are under consideration. It would, of course, be an advantage to the Eastern to secure control of this road, which interferes somewhat with its Lynn business, and also carries a large local travel along the beach in summer.

Cairo & Vincennes.—Messrs. J. S. Morgan & Co. have issued, in London, a circular to the holders of the first-mortgage bonds, reporting the completion of the scheme of reorganization proposed in the circular of March 1, 1880. The owners receive, for the principal of their bonds, common stock of the Cairo & Vincennes Railway, and, for the arrears of interest, preferred stock. Of the 3,500 first mortgage bonds of the old company, 3,467 have been surrendered, leaving only 33 outstanding. The certificates of stock, preferred and common, in the new company are now being issued against the receipts for the old company's bonds. The railroad has been handed over by the Receivers to the new company as on June 30 last, and the Receivers have been finally released by the Court from their office and trust by a decree dated Nov. 23, 1880. The accounts filed by the Receivers prior to their discharge, covering the period during which the property was under the administration of the Court, viz., from May 17, 1874, to June 30, 1880, are printed, with the Auditor's report thereon, showing a deficit on their operations of $136,179, after deducting the proceeds of rolling stock sold in 1876. Between June 30, 1880, the date from which the new company's management will be held to commence, and Nov. 23, the date of the Receivers' release, the above-named deficit was increased by a sum of $129,237, chiefly for judgment claims, which had to be discharged before the Court would release the Receivers. Independently of these judgment claims the total deficit of $265,417 is attributable to the large expenditure for what was practically new construction under the head of maintenance of way, amounting in the last two years to $98,004 and $198,604 respectively, an average of $148,300 per annum, against an average of the previous four years of $65,300 per annum. Good results are anticipated from the new connections now being opened. The St. Francisville & Lawrenceville junction with the Paris & Danville road to the north is in operation, and is leased to the two companies jointly at about 7 per cent. interest on the cost. The entry of the road into Chicago, over the Chicago & Eastern Illinois completes the connection of the Cairo & Vincennes with that city. When the junction with the Mobile & Ohio road to the south, now in active progress, is completed, the Cairo & Vincennes will form a link in a through route from Chicago to the Gulf. Works are being pushed forward also for the enlargement of the terminal facilities at Cairo. The deficit resulting from the Receivers operations, already referred to, and the reorganization expenses, together more than absorb the $285,000 of preference stock reserved for these purposes. It has not been found practicable to provide from this source, as was intended, for the necessary rolling stock, which, therefore, pending arrangements for its final purchase, will be leased to the company at 7 per cent. interest on the net cost, as entered in the books, which amount is considerably below the actual cash value. As the $285,000 preferred stock above referred to would not, at present market price, suffice to cover the deficit assumed by the new company, Mr. J. S. Morgan has, in order to facilitate a financial adjustment, consented to receive payment for the total amount of Receivers' certificates held by him in said stock at par.

The circular says, in conclusion: "The exceptional expenses incident to a recent reorganization of a company without available capital will, we expect, absorb all the earnings for some time, and we do not look for any dividend on either preferred or common stock before 1882. The directors, however, will in due course issue reports to the shareholders of their operations from the commencement of the current financial year."

Central, of New Jersey.—It is current report that negotiations are in progress for making this road part of a through line from New York to the West. What is in view is not very definitely stated, but it seems to be the old project for a line from the Reading at Williamsport by Jersey Shore and Coudersport to a connection with the New York, Pennsylvania & Ohio and thence to Buffalo.

Central Vermont and Northern War.—Several conferences have been held in Boston recently at which an agreement has been reached between the Central Vermont on the one hand and the Northern, Concord and Lowell companies on the other. On Feb. 15 the Central Vermont resumed the shipment of through business to Boston over the Northern and Lowell roads.

Chicago, Rockford & Northern.—Proceedings in foreclosure have been begun by the trustees under the first mortgage, and the Illinois Circuit Court has appointed a receiver on their application. A suit was begun under the second mortgage some time ago, and a receiver then appointed. The Chicago & Iowa claims to hold a lease of the road, and the Receiver is directed to report on this claim. The road extends from Rochelle, Ill., to Rockford, 16 miles, and was built as a branch of the Chicago & Iowa.

Chicago, St. Paul, Minneapolis & Omaha.—The bill legalizing and authorizing the formation of this company by the consolidation of the St. Paul & Sioux City, the Chi-

cago, St. Paul & Minneapolis and the North Wisconsin companies, has passed the Minnesota Legislature and become a law.

Chicago, St. Louis & New Orleans.—In the suit of this company against H. S. McComb, the United States Circuit Court has overruled a demurrer put in and decides that Mr. McComb must put in more definite answers to the allegations in the complaint, or certain bonds which he holds, and which are disputed by the company, will be declared invalid and void.

Dallas & Wichita.—A bill has been filed in the United States Circuit Court at Dallas, Tex., to cancel and set aside the mortgage made by this company as reorganized, and to set aside the lease of the road to the Texas & Pacific. The bill charges that the present organization is irregular and void, and that the mortgage is therefore not duly authorized; also that the charter of the company does not allow it to lease its road.

Dayton & Southeastern.—A large amount of the stock of this company was recently sold to persons in the interest of the Baltimore & Ohio, and it was said that that company had secured control. Last week the directors suddenly resolved to sell $400,000 stock which remained in the treasury of the company out of the $1,000,000 authorized. The ostensible object of the sale was to provide money to pay off the floating debt and complete the extension of the road. The new stock was all taken at once by Gen. John M. Corse, President of the Toledo, Delphos & Burlington. With other friendly stock, this secures the control of the road, which is of 3 ft. gauge and 125 miles long, from Dayton east by south to Wellston.

Delaware, Lackawanna & Western.—This company gives notice that it will pay the principal of the Morris & Essex 7 per cent. construction bonds, at its office in New York, on or before March 15 next, and that interest on those bonds will cease from that date. The amount of these bonds by the last report was $573,000 ; they run till 1889, but are now payable at the option of the comprny.

Delaware River.—All the stock of this road has been sold to the Duponts, the powder manufacturers of Wilmington, Del. The road runs from Woodbury, N. J., to Pennsgrove on the Delaware, opposite Wilmington, and is 20 miles long. It was formerly the Delaware Shore road and came to the present company through foreclosure. The new owners will put the road in good condition.

Delaware Western.—The bill authorizing the extension of this road so as to make it part of a line between Baltimore and Philadelphia has passed the Delaware Senate after a sharp fight.

East Line & Red River.—The track on the extension of this road has now reached Sabine, 11 miles westward from the late terminus at Greenville, Tex., and the trestle bridge over the river at that point is being put up.

Fort Smith & Great Northern.—This company has been organized at Fort Smith, Ark., to build a railroad from that place northward to the Missouri line, about 80 miles.

Gulf, Colorado & Santa Fe.—The contract for the grading and bridging from Cleburne, Tex., to the Brazos River, about 30 miles, has been let to Roach & Tierney. Work has already been begun.

Illinois Central.—During the month of January the earnings of the lines operated by this company were as follows :

	1881.	1880.	Inc. or Dec.	P. c.
In Illinois	$477,799.00	$467,448.98	I. $10,350.02	2.2
In Iowa (leased lines)	122,673.00	127,184.18	D. 4,511.18	3.6
Totals	$666,472.00	$594,633.16	I. $5,838.84	0.9

During January, 1881, the land sales were 2,630.90 acres for $17,624.16, and the cash collected on land contracts was $18,750.37.

International & Great Northern.—The construction train on this road reached San Antonio, Tex., on Feb. 3, completing the main line of 341 miles from Texarkana. Work is progressing actively between San Antonio and the Rio Grande and tracklaying will soon be begun. Contracts have been made for a large number of ties for the extension.

Lake Erie & Western.—Notice is given that regular trains have begun to run through to Sandusky, O., over the new extension from Fremont to that place.

The Cincinnati *Enquirer* starts a report that most of the road-bed of the new extension is really the property of the state of Ohio, and that it is proposed to take action in the Legislature to assert the claim of the state thereto as assignee or successor of the old Ohio Railroad Company.

Lake Shore & Michigan Southern.—This company has placed orders for 30 locomotives with the Schenectady Works, and for 25 with the Grant Works at Paterson. Since the 1st of October it has ordered 2,300 new freight cars.

Long Island North Shore.—Arrangements are being made to organize a company to build a railroad along the north shore of Long Island from Astoria to Northport, about 40 miles. Dissatisfaction with the present management of the Long Island road is the moving cause of the new enterprise.

Minneapolis, Lyndale & Minnetonka.—This company has been formed by the consolidation of the Minneapolis, Lyndale & Lake Calhoun, the Minneapolis & Lake Park and the Lyndale companies. The consolidated company now owns a line from Minneapolis, Minn., to Lake Harriet, which is to be extended at once to Lake Minnetonka, well known as a summer resort. An extension is also to be built to Minnehaha and Fort Snelling.

Nashville, Chattanooga & St. Louis.—Reports are current in New York that the Louisville & Nashville Company has come to an understanding with the other stockholders of this company. It is said that an agreement has been made by which all opposition to the Louisville & Nashville control and management is to be withdrawn, and that company, in return, will guarantee the payment of regular dividends on all the stock outside of its own holding. The report lacks official confirmation.

New Brunswick.—Preparations are being made for changing this road from 3 ft. 6 in. to standard gauge as soon as possible. The new standard-gauge locomotives have been ordered, and the company's shops are building 200 new cars, besides new trucks for the old cars. A large quantity of new rails have been ordered. Work is soon to be begun on the extension of the Aroostook Branch from Caribou, Me., to Presque Isle.

New Orleans Pacific.—It is stated that an agreement has been completed for the purchase from Morgan's Louisiana & Texas Company of the old New Orleans, Mobile & Texas track from Westwego, opposite New Orleans, to Bayou Goula. Contracts have been let for grading the gap from Bayou Goula to Lecompte, 107 miles, and the whole line from New Orleans to Shreveport is now under contract.

New York Central & Hudson River.—Since the 1st of October this company has placed orders for 50 new locomotives with the Schenectady Works, and has ordered 30 new passenger cars, 20 of which will be built in its own works at West Albany and the other 10 at Troy. It has also ordered 2,615 new freight cars.

A curious suit has been begun by an owner of property who claims $50,000 damages for the depreciation in value of his property caused by the building of this company's freight depot on what was formerly St. John's Park in New York. The case is now on trial.

Pennsylvania.—The track on the extension of the Pittsburgh, Virginia & Charleston Division is now laid to Brownsville, Pa., 12 miles southward from last year's terminus at Belle Vernon, and 53 miles from Pittsburgh. The new track has not yet been ballasted and was somewhat damaged by land-slides in last week's storm, and regular trains will not run through for several weeks yet.

In the litigation over the control of the telegraph lines on the New York Division, an agreement has been made to suspend all further proceedings for the present, pending negotiations for a new and permanent agreement.

Argument has been in progress for several days on the application for a writ of sequestration to enforce previous orders of the United States Circuit Court in the Junction Railroad case. On Feb. 15, the Court stopped the arguments and announced that, in consequence of the great mass of testimony taken, the entire case would be referred to an examiner and three experts, who would be directed to report to the Court as soon as possible.

In the United States Circuit Court on Feb. 16, the following order referring the Junction Railroad suit to an examiner and experts was made:

"The testimony taken is referred to S. D. Davis, G. C. Gardner and E. K. Hyndman, Master and Commissioners, to ascertain and report first, whether the passenger trains mentioned in the petition have been unnecessarily detained in passing through the respondent's yard; second, whether the said trains have been delayed to give precedence to the respondent's freight business, and what effect on the safety of said trains and on the respondent's business in the yard would be produced by according to the said passenger trains what are known as passenger rights in passing through the yard; third, whether the use of the tracks between Thirty-fifth street and Market street has been in any manner affected by alterations, by the respondents, since the same were opened for travel, and if so, to what extent and where such alterations were made."

A motion by counsel for the Baltimore & Ohio road asking that the present injunction be suspended until the final decree is given by the Court, was made returnable at the same time as the report of the Master and Commissioners.

Philadelphia & Reading.—In the United States Circuit Court in Philadelphia, Feb. 14, Judge McKennan made an order in the revocation proceedings of McCalmont Bros. & Co. against this company in connection with the issue of deferred income bonds. The order set forth that "such part of said order of Nov. 18, 1880, as purports to confer authority by this Court upon the Philadelphia & Reading Railroad Company to adopt and carry into effect the deferred bond which is generally described in said order, be and the same is hereby revoked, and that said order shall be construed and taken only as relieving said company from the effect of the injunction order made by this Court when the Receivers of the property of the said company were appointed, by permitting it to exercise upon its own responsibility and according to its own legal discretion such powers as its charter conferred upon it in providing means for the payment of its debts in the mode proposed."

In the suit of the McCalmonts relative to the consolidated bond scheme an order was made continuing the further hearing of the motion for a preliminary injunction until March 25. Until the decision of the motion by the Court the respondents are restrained from making any agreement or ordering any act by which the railroad company may be definitely bound touching the deferred bond plan or the proposed mortgage loan of $150,000,000. The order concludes: "Neither the respondents nor the Receivers appointed by this Court shall declare to be forfeited any rights, acquired or supposed to be acquired, by the subscribers to said deferred bond plan, by reason of the non-payment of installments to their subscriptions; that the said Receivers have leave to receive from any of said subscribers the amounts of the several installments of their subscriptions as a deposit, and to give receipts therefor as such, and that a separate account of such payments shall be opened by the Receivers, and the same shall be so kept as that the money paid by each subscriber can be traced, identified and returned to him, if the Court shall hereafter so order."

Judge Butler read an opinion concurring in both orders, and Judge McKennan in making his rulings declared that all things must be kept in their present position until the time arrives for the stockholders to express their judgment not only on what has been done by the managers of the company, but as to what shall be done hereafter.

Pittsburgh & Lake Erie.—The Smithfield street bridge over the Monongahela at Pittsburgh, which is now being rebuilt, has been bought in the interest of this company. It is said that the new bridge will be made a railroad as well as a highway bridge, and used by this road.

Portland & Ogdensburg.—A bill in equity has been filed against this company in the United States Court at Portsmouth, N. H., by the Mercantile Trust Company, of New York, under the mortgage of 1871 for $3,300,000, under which $1,895,000 bonds have been issued. The bill sets forth that interest on the bonds has been unpaid since 1876, and asks that the earnings of the road may be applied to the payment of interest, and other remedies provided, if necessary, to secure the rights of bondholders.

Providence & Worcester.—The board has decided to issue $500,000 new stock, to be used in completing the second track on the road, building new shops at Valley Falls and making other permanent improvements. Until July 1 the present stockholders will have the option of taking one share of the new stock at par for each four shares of their present holdings.

Quebec & Lake St. John.—At the annual meeting in Quebec, recently, a report was submitted, which stated that work had been pushed forward by the contractors on the first section, from Quebec to St. Raymond. The track has been laid into the last-named place, and arrangements have been made to run regular trains as far as St. Catharine by June 1, and to St. Raymond by July next. The road being built with stone culverts, steel rails and iron bridges, is better than any road in the province, with the exception of the government line. Surveys proved that the route via St. Raymond and the Batiscan was the best, being 1,000 feet lower in elevation than the other. Official information from the Crown Land Department establishes that within a radius of about 40 miles from the proposed location of the road, and around Lake St. John, there are 6,000 000 acres of land, of which 3,000,000 acres are chiefly formed of an alluvial deposit, well adapted for colonization and farming, and the balance of great value for lumbering purposes. The Quebec Legislature last session adopted a bill permitting changes in the location of the road and limiting the time for the completion of the road to the foot of the Island of Lake Edward, 45 miles, to Dec. 31, 1882, or in default thereof cancelling the charter of the company for the balance of the road. The city of Quebec subscription has thus far only been voted as far as St. Raymond, and a further subscription is recommended. The Dominion government has been asked to guarantee interest upon the company's debentures. Delegates were sent to London and Paris to arrange for capital, who received hopeful assurances of getting it as soon as the subsidies above described were forthcoming. As to traffic, some 20,000 cords of firewood for the Quebec and Montreal markets are being got out, and considerable quantities of other descriptions of lumber are being made.

Rochester, New York & Pennsylvania.—This company has filed articles of incorporation in New York, covering a line from Mt. Morris, N. Y., to Ross Junction on the Erie. It is, apparently, a reorganization of the old Rochester, Nunda & Pennsylvania.

St. Joseph Valley.—This company has now on hand all the equipment and material for its road from Buchanan, Mich., to Berrien Springs. There is about one mile still to be graded, and this will be done and the track laid as soon as the weather permits.

St. Louis, Iron Mountain & Southern.—The following circular has been issued to the stockholders of this company:

"The greatly increased traffic on the St. Louis, Iron Mountain & Southern Railway has worn the iron rails on that part of the road in the state of Arkansas to such a degree that it is to the interest of the company, as well as of the public and of the bondholders and stockholders, to replace at once with steel the remaining part of the road, from St. Louis to the state line of Texas. The work of ballasting, rearrangement of track and laying with steel, has been going on during the year 1880, consuming all the net receipts over the fixed interest charges.

"With the view of consolidating the entire mortgage, income and all other debts of the company, at a lower rate of interest, and to provide for improvements, the board of directors have authorized the issue of general consolidated 5 per cent. bonds, 50 years to run, into which to fund the income and divisional mortgage bonds, as also to pay for the above-named improvements of the road, including the laying of about 200 miles with steel. For which purpose an issue of bonds amounting to $2,000,000, in addition to the present bonded debt of the company, is necessary.

Bonded debt of all kinds at the time of the resolution of the board	$30,086,000
Proposed increase	2,000,000
Total	$32,086,000

"When this consolidation of debt shall have been effected, the interest charges on the entire debt of the company will be only $1,604,300, as against the present fixed and accumulative income interest charges of $2,066,089.

"The directors have ordered the construction of several branches which have been much needed, and have the conviction that it will be wise in due time to acquire some adjoining roads. For this purpose the authority is asked to increase the capital stock of the company to $35,000,000.

"It will be needful only to state that such additional stock, when issued, cannot be sold at less than par."

St. Louis, Jerseyville & Springfield.—This company will receive at the office of James A. Locke, President, at Jerseyville, Ill., from Feb. 21 till March 5, proposals for the construction, grading and timber work of its projected road. Profiles, estimates and other information, can be obtained at the office. The work will be divided into three parts, and bids will be received either for the whole line or one or two of the parts. The road is to run from Springfield, Ill., by way of Jerseyville, to Grafton on the Mississippi at the mouth of the Illinois.

Telegraph Consolidation.—A suit has been begun in New York by W. S. Williams, a Western Union stockholder, to enjoin the consolidation of the telegraph companies, on the ground that the amount of Western Union stock to be issued is very much beyond the value of the property to be bought, and that the issue of new stock is an injury to holders of existing stock and an infringement of their rights.

Another suit to enjoin the consolidation has been begun by the United States Direct Cable Company. It is based on certain contracts with the Atlantic & Pacific Telegraph Company.

Toledo, Cincinnati & St. Louis.—This company has filed articles of incorporation in Indiana for a line from the Ohio state line in Adams County across the state to the Illinois line in Vermilion County, a distance of 175 miles. It is the St. Louis line of the Toledo, Delphos & Burlington.

Truckee & Quincy.—It is proposed to build a railroad from Truckee in Nevada County, Cal., northwest by the Sierra and Mohawk valleys to Quincy in Plumas County, a distance of about 60 miles. Much of the country on the line is fertile and well settled. The route is partly the same as that on which the Sierra Iron Company proposes building a narrow-gauge road.

Union Pacific.—It is stated that this company will this year build branches from Denver, Col., to the coal mines at Erie, and also from Greeley, Col., to Ft. Collins and up the Cache-la-Poudre River to the North Park. Work will also be begun on the proposed Oregon Branch, from Ogden to Baker, Oregon.

ANNUAL REPORTS.

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Louisville, New Albany & Chicago.

This company owns a main line from New Albany, Ind., northward to Michigan City, 288.52 miles, with the Louisville Branch, 1.02 miles, or 289.54 miles in all. There are 35.17 miles of sidings. The report is for the year ending

Dec. 31, 1880, and is the first ever issued, though the road has been in operation many years.

The earnings for the year were as follows:

	1880.	1879.	Inc. or Dec.	P. c.
Passengers	$183,135	$160,187	I. $22,948	14.2
Freight	615,826	495,883	I. 119,943	24.2
Mail, express, etc.	40,208	40,561	D. 353	0.9
Total	$889,169	$696,631	I. $142,538	20.5
Expenses	579,247	596,657	D. 17,410	2.9
Net earnings	$259,922	$99,974	I. $159,948	160.0
Gross earn. per mile	2,898	2,406	I. 492	20.5
Net " "	898	345	I. 553	160.0
Per cent. of exps.	69.14	85.65	D. 16.51	...

The report, after noting the increase in passenger business, says: "On account of the unevenness of our track, and the consequent impossibility of making fast time, and close and prompt connection with safety, no efforts have been made to secure through business. I can see no reason why we should not, from this time forward, secure our fair share of the through passenger travel from Louisville to Chicago, and a very largely increased local business to and from both Louisville and Chicago to points on our line.

"The gross earnings from freight for 1880 were greater than those of 1879 by $119,942, or 24.19 per cent. The first eight months showed an increase of 42 33 per cent over the corresponding months of 1879. This rate of increase could and would have been continued through the year if our company had been able to supply the demand for cars. We were compelled to refuse business every day. The great rush began in September. Our connecting roads, that had in other years kindly, and for mileage, to a large extent, supplied our road with cars to do the business, had now more than they could manage in moving the accumulating and accumulated freight at their terminal points and along their lines. The line cars from the East, destined for our and other Western roads, were seized before reaching their destination and loaded back."

Since the present company acquired the road through foreclosure in 1872, it has had no bonded debt until last year, when $600,000 were issued. The income account is as follows:

Surplus Jan. 1, 1880		$3,928
Net earnings for the year		259,922
Realized from sale of bonds		595,168
Total		$859,018
Expended on improvements and charged to construction for road improvements	$350,440	
New engines	53,361	
New cars	194,304	
Depot grounds, etc	22,733	
		620,838
Surplus, Jan. 1, 1881		$238,180

The report says: "The largest expenditure for improvements was in the Road Department. During the year 95 miles of the old English 3½-inch iron have been taken up and relaid with 13 miles of steel and 82 miles of re-rolled iron rails, and 4.09 miles of additional side-track have been laid. The steel was put on the heavy grades and in the towns where the track is almost in constant use.

"The Pittsburgh, Cincinnati & St. Louis Railway Company, having notified us some time ago that it could no longer furnish us terminal facilities in Louisville, your Executive Committee has purchased depot grounds in that city, and will at once erect freight sheds for the transaction of this part of our business."

Delaware & Hudson Canal Co.

The following summary of the business of this company for the year ending Dec. 31 is published in advance of the full report. The receipts and expenses were as follows:

	1880.	1879.	Increase.	P. c.
From coal	$7,402,543	$6,403,907	$998,636	15.6
From railroads	4,673,436	3,152,839	1,520,597	48.2
Miscellaneous	448,570	415,303	33,267	8.0
Total	$12,524,549	$9,972,049	$2,552,500	25.6
Expenses of all kinds	7,913,507	7,455,033	458,474	6.2
Net earnings	$4,611,042	$2,517,016	$2,094,026	83.2
Interest and rentals	3,259,620	3,147,659	111,961	3.6
Net profit	$1,351,422	...	...	...
Deficit	...	$630,643	...	...

The net profit last year was equivalent to 6½ per cent. on the stock, and is in very marked contrast to the deficit of the previous year.

Jeffersonville, Madison & Indianapolis.

This company owns a line from Indianapolis to Louisville, 110.58 miles, with branches from Columbus, Ind., to Madison, 45.90 miles; Columbus to Shelbyville, 23.28 miles, and Jeffersonville to New Albany, 6.44 miles, making 185.90 miles in all. It also owns one-half interest in the Cambridge Extension, referred to below. The whole property is leased to the Pennsylvania Company. The Shelby & Rush road, from Shelbyville to Rushville, 18.42 miles, and the Cambridge Extension, 20.80 miles, are leased by the same company, and worked as a branch of this road, but their earnings are not included. The following statements are for the year ending Dec. 31, 1880.

The stock and debt are as follows:

Stock ($10,758 per mile)	$2,000,000
Bonds ($25,707 per mile)	4,779,000
Total ($36,464 per mile)	$6,779,000

The bonded debt consists of $397,000 Indianapolis & Madison bonds; $2,382,000 first-mortgage bonds, and $2,000,000 second-mortgage bonds, all bearing 7 per cent. interest. The first-mortgage bonds were reduced $13,000 during the year.

The earnings and expenses were as follows:

	1880.	1879.	Inc. or Dec.	P. c.
Passengers	$415,213.52	$358,751.44	I. $56,462.08	15.7
Freight	883,091.38	787,386.06	I. 95,705.32	12.2
Mail and express	48,042.94	46,303.15	I. 1,739.79	3.8
Miscellaneous	42,217.07	53,893.11	D. 11,676.04	21.7
One-half net earnings of Cam. Ext.	3,990.49	1,802.95	I. 2,187.54	121.5
Total	$1,392,555.40	$1,248,136.71	I. $144,418.69	11.6
Expenses	847,026.46	753,470.26	I. 93,556.20	12.4
Net earnings	$545,528.94	$494,666.45	I. $50,862.49	10.3
Gross earn. per mile	7,490.93	6,714.02	I. 776.91	11.6
Net earn. per mile	2,934.53	2,660.93	I. 273.60	10.3
Per cent. of ex.	60.83	60.37	I. 0.46	...

The earnings show a large increase; the expenses increased in a slightly greater ratio, leaving still a very good gain in net earnings.

The result to the lessee was as follows:

Net earnings, as above		$545,528.94
Interest on bonds	$334,285.00	
Dividends on stock	126,666.67	
Sinking fund	15,000.00	
Maintenance of lessor's organization	2,150.85	
		478,102.52
Balance, profit to lessee		$67,426.42

This surplus is over 2½ per cent. on the stock. In 1879 the lessees' profit was only $2,553.95, while in 1878 there was a deficit of $66,938. The profit to the lessee is the largest that has been returned in any year of the lease.

Burlington, Cedar Rapids & Northern.

This company operates lines from Burlington, Ia., to Albert Lea, Minn., 253 miles; from Muscatine, Ia., to Montezuma, 88 miles, with a branch from Thornburg to What Cheer, 5 miles; Vinton to Clarion, 104 miles; Linn to Postville, 95 miles, and Elmira to Iowa Junction, 19 miles, making 564 miles in all. Extensions from Thornburg to Montezuma, 16 miles, and from Holland to Clarion, 56 miles, were built during the year. The main line from Manly to Northwood, 11 miles, is leased from the Central Iowa. The sections from the Minnesota line to Albert Lea, 12½ miles, and from Riverside to Montezuma and What Cheer, 62 miles, are under separate organizations, though really owned. The following brief statements for the year 1880 are published.

The stock and debt are as follows:

Stock ($9,946 per mile)	$5,500,000
Bonded debt ($14,342 per mile)	7,931,000
Total	$13,431,000

The bonded debt consists of $6,500,000 of the company's own 5 per cent. bonds; $825,000 guaranteed 6 per cent. bonds and $606,000 guaranteed 7 per cent. bonds.

The earnings for the year were as follows:

	1880.	1879.	Increase.	P. c.
Earnings	$2,053,481.83	$1,534,950.90	$518,530.93	33.8
Expenses	1,343,724.71	984,808.79	358,915.92	36.4
Net earnings	$709,757.12	$550,142.11	$159,615.01	29.0
Gross earn. per mile	3,979.62	3,536.75	442.87	12.5
Net earn. per mile	1,375.50	1,267.61	107.89	8.5
Per cent. of exps	65.44	64.15	1.29	...

The yearly interest charge is $416,920. If this is deducted from the net earnings, it would leave a balance of $192,837.12, which is equivalent to 2.97 per cent. on the stock for the year. The surplus has mainly been used in improving the road and buying new equipment.

Utica & Black River.

This company owns a line from Utica, N. Y., to Philadelphia, 87 miles. It leases the Black River & Morristown, which extends the road to Morristown on the St. Lawrence, 37 miles; the Ogdensburg & Morristown (really owned), which extends it 10 miles further to Ogdensburg; the Clayton & Theresa, a branch from Theresa to Clayton on the St. Lawrence, 16 miles, and the Carthage, Watertown & Sackett's Harbor, a branch from Carthage to Sackett's Harbor on Lake Ontario, 30 miles. The total mileage is 180 miles. The report is for the year ending Sept. 30, 1880.

The equipment consists of 20 locomotives; 23 passenger and 10 baggage cars; 210 freight cars. Two locomotives were added during the year.

The general account is as follows:

Stock ($20,368 per mile)		$1,772,000.00
Bonds ($12,872 per mile)		1,112,000.00
Accounts and balances		55,225 50
Surplus fund		288,682.14
Total		$3,227,907.64
Road and equipment ($32,276 per mile)	$2,808,048.76	
Leased lines, stocks and bonds	183,100.00	
" " advances	125,662.32	
Cash and receivables	111,096.56	
		3,227,907.64

Stock was increased during the year by $280; cost of road by $10,462.65. The company pays interest on $495,000 Black River & Morristown and $200,000 Clayton & Theresa bonds as rental for those roads; also on $300,000 Carthage, Watertown & Sackett's Harbor bonds, but all over 37½ per cent. of the gross earnings of that line is an advance.

The earnings for the year were as follows:

	1879-80.	1878-79.	Inc. or Dec.	P. c.
Passengers	$220,350.83	$190,856.63	I. $29,494.20	15.4
Freight	334,800.07	259,599.90	I. 75,200.17	29.0
Other sources	35,609.64	25,051.81	I. 10,557.83	42.2
Total	$590,760.54	$475,508.34	I. $115,252.20	24.2
Expenses	274,989.18	290,531.71	D. 15,542.53	5.4
Net earnings	$315,771.36	$184,976.63	I. $130,794.73	70.7
Gross earn. per mile	3,282.00	2,641.71	I. 640.29	24.2
Net earn. per mile	1,754.29	1,027.65	I. 726.64	70.7
Per cent. of exps.	46.55	61.12	D. 14.57	...

The increase in earnings was very large in reality, and was made still larger apparently by the receipt of $4,055.38 in settlement of mail transportation in previous years. Part of the reduction in expenses was due to the failure of contractors to deliver material ordered before the close of the year.

The income account for the year was as follows:

Net earnings		$315,771.36
Rents, interest, old material		11,050.84
Total		$326,822.20
Interest paid	$126,490.00	
Carthage, W'town & S. H., proportion of earnings	21,568.60	
Dividends, 4 per cent	70,832.00	
		218,890.60
Balance, surplus		$107,931.60

New construction and equipment cost $14,551.45. On the Black River & Morristown road $520, and on the Clayton & Theresa $2,478.19 were spent during the year. The proportion of earnings due the Carthage, Watertown & Sackett's Harbor road was less than the interest, etc., paid by $15,761.19, which sum was advanced by the lessee.

Semi-annual dividends were paid, of 2 per cent. each.

The traffic for the year as reported to the State Engineer was as follows:

Train mileage:	1879-80.	1878-79.	Inc. or Dec.	P. c.
Passenger	286,030	289,504	D. 3,474	1.2
Freight	146,846	143,336	I. 3,510	2.4
Total	432,876	432,840	I. 36	...
Passengers carried	236,656	213,019	I. 23,637	11.1
Passenger mileage	5,836,600	5,221,906	I. 614,694	11.8
Tons freight carried	160,932	108,880	I. 52,052	47.7
Tonnage mileage	9,204,785	6,062,017	I. 3,142,768	51.8
Av. train load:				
Passengers, No.	20.41	18.3	I. 2.38	13.2
Freight, tons	62.70	42.30	I. 20.40	48.2
Av. rate:				
Per pass. per mile	3.77 cts.	3.65 cts.	I. 0.12 ct.	3.3
Per ton per mile	3.73 "	4.28 "	D. 0.65 "	15.2

The freight tonnage was as follows: Products of the forest, 19,193 tons; products of animals, 15,056; vegetable food, 15,223; other agricultural products, 23,963; manufactures, 28,821; merchandise, 9,216; other articles (including 23,398 tons ore and 14,952 tons coal), 49,460; total, 160,932 tons.

During the year there were bought and paid for two new locomotives and some new tools for the Utica shop. Two new stalls were added to the Utica round-house, some new sidings built and the car-dock at Ogdensburg, with the tracks leading to it, finished. This gives the road access to the ferry transfer across the St. Lawrence, by which the Canada Central road is reached and a considerable lumber traffic secured. There were ordered during the year 1,000 tons of steel rails, two new iron bridges, 30 box and 20 flat cars; all these have been delivered during the current year.

During the present year five bridges must be renewed in iron; that over Black River north of Carthage is already under contract. At least 20 new box cars are needed. It will also be necessary very soon to build and stock new repair shops, as the present shops are entirely inadequate to the work required.

Lehigh Coal & Navigation Company.

This company has a great coal property in the Lehigh and Wyoming anthracite regions, and it owns the Lehigh Canal from Mauch Chunk, Pa., to Easton, and leases the Delaware Division Canal from Easton to Bristol. It also owns the Lehigh & Susquehanna Railroad from Easton to Wilkesbarre, 105 miles, with 50 miles of short branches, and leases the Lehigh & Lackawanna, 25 miles; Nesquehoning Valley, 17.5 miles, and the Tresckow road, 6.5 miles. These railroads, 204 miles in all, are leased to the Central Railroad of New Jersey, and worked by the Receiver of that road. The report is for the year ending Dec. 31, 1880.

The coal tonnage of the railroads and the Lehigh Canal was as follows:

	1880.	1879.	Inc. or Dec.	P. c.
To connecting lines at Packerton and above Mauch Chunk	119,632	92,772	I. 26,860	28.9
Consumed on line above Mauch Chunk	98,654	99,170	D. 516	0.5
East of Mauch Chunk by canal	431,013	456,031	D. 24,118	5.3
East of Mauch Chunk by rail	3,255,194	3,510,061	D. 254,867	7.3
Total	3,905,393	4,158,034	D. 252,641	6.1

The coal came in 1880 as follows: Lehigh Coal & Navigation lands, 545,161 tons; sundry shippers, 102,152; Hazleton, Beaver Meadow and Mahanoy regions, by Lehigh Valley road, 65,575; Beaver Meadow, by Nesquehoning Valley road, 501,076; Black Creek Region, by Drifton Branch, 401,943; Upper Lehigh Region, by Nescopec Branch, 448,323; Wyoming Region, 1,841,163; total, 3,905,393 tons.

The revenue account for the year was as follows:

	1880.	1879.	Inc. or Dec.	P. c.
Railroad and Nesquehoning Tunnel	$1,157,909.22	$828,817.29	I. $329,091.93	39.7
Lehigh Canal, including water power	128,421.82	71,760.96	I. 56,660.86	78.7
Delaware Division Canal	90,176.38	47,589.87	I. 42,586.51	88.7
Net profit on Lehigh coal	185,626.14	190,622.83	D. 4,996.79	2.6
Royalty, rents, etc	47,542.96	45,057.98	I. 2,484.98	5.5
Total receipts	$1,609,676.52	$1,183,848.93	I. $425,827.59	36.0
General and legal exps	51,792.62	51,333.38	I. 459.24	0.9
Rent and taxes Les. Val. R. R.	97,050.00	138,000.00	D. 40,950.00	29.7
Rent and taxes Del. Div. Canal	125,438.03	118,867.52	I. 6,570.51	5.5
Other taxes	81,152.80	77,452.74	I. 3,700.06	4.8
Interest account	932,231.11	923,958.66	I. 8,272.45	0.9
Total expenses	$1,287,664 56	$1,309,612.30	D. $21,947.74	1.7
Net earnings	$322,011.96	...	...	...
Deficit	...	$125,763.37	...	...

Payments or charges on net earnings, were as follows:

Net earnings		$322,011.96
Depreciation on coal improvements	$53,864.54	
Sinking fund, 10 cents per ton, on coal mined	55,317.00	
Restored to profit and loss, the encroachment of 1879	18,561.04	
		127,775.58
Surplus		$194,236.38

This is the first surplus reported for several years.

The earnings of the 204 miles of railroad were as follows:

	1880.	1879.	Increase.	P. c.
Passage and mails	$144,375.65	$118,658 73	$25,716.92	22.0
Freight and express	465,397.76	341,771.02	123,626.74	36.0
Coal	2,804,272.00	1,953,332.14	850,939.86	43.5
Total	$2,414,045.41	$2,413,761.89	$1,000,283.22	41.4
Per mile of road	16,735.52	11,832.17	4,903.35	41.4
This Co.'s proportion	1,138,015.13	804,587.29	333,427.84	41.4

The report says: "The amount of coal transported (on the railroad) was 3,843,209 tons, or, 6 per cent. less than 1879, but transportation rates were more remunerative than in that year. Our railroads have been well maintained by our lessee, and large additions have been made to equipment during the past two years. Further purchases of cars and engines are about being made, and it is the aim of the Receiver of the New Jersey Central Railroad Company to maintain both road and equipment in a thorough state of efficiency, and ready for any demands that may be made upon them by the increasing activity in all branches of trade. * * *

"Canal navigation opened March 22 and was closed by ice on Nov. 20. The net revenue of both canals, after paying rent and taxes of Delaware Division Canal, was $90,592.10, against a loss of $1,246.94 in 1879. This improvement is due entirely to more remunerative rates of toll, as 24,118 tons less coal were transported than in the previous year. Had the canals remained open as usual, till two weeks later, there would have been no loss in tonnage, but owing to the early cold weather this was unavoidable.

"The canals are in very good condition, and require a smaller amount of renewals and repairs this winter than usual. We have increased our equipment during the year, and at the close of the season owned 309 boats, of which all but two were in good condition, being an increase of 52 boats. We have contracted for 25 additional boats, and are building six at the company's yards.

"The production of coal during the year was 554,937 tons of prepared sizes, against 700,761 tons in 1879, a decrease of 145,824 tons. The profit was $185,626.14, compared with $190,622.83 in the previous year.

"The over-production of anthracite coal in 1879, followed by a mild winter, rendered frequent suspensions of mining necessary to reduce the output during the past year. These suspensions materially increased the cost of producing our own coal, which, together with an advance in transportation, wages and supplies, consumed a large part of the increased price at which we were able to sell."

REPORTS OF NEW YORK RAILROADS TO THE STATE ENGINEER AND SURVEYOR FOR THE YEARS ENDING SEPT. 30, 1880, AND SEPT. 30, 1879.

Name of Road	Year.	Miles of road	Miles of track	Number of locomotives	Number of Cars. 1st class pass.	2d class pass.	Baggage, mail and express.	Freight	Capital stock	Funded debt	Floating debt	Cost	Train Miles. Passenger.	Freight.	Service.
27. Geneva, Ithaca & Sayre*	1880	113 6	132.3	13	7	.....	5	228	$1,675,000	$600,000	$139,948	$1,931,053	134,075	266,730	.....
	1879	113.6	133.3	13	7	.....	5	219	1,475,000	600,000	194,9 8	1,917,929	114,914	193,420	.....
28. Greenet	1880	8.1	8.7	2	1	.....	.....	1	200,000	200,000	85.50	400,086	12,:.88	21,667	... .
	1879	8.1	8.7	2	1	.....	.....	1	200,000	200,000	85.50	400,086	12,981	21,015	.....
29. Greenwich & Johnsonville‡	1880	14	15.2	.....	.....	.....	.....	...	1 7,900	7,000	... .	155,332	15,7.8	15,768	.....
	1879	14	14.8	.....	.....	.....	.....	.....	130,898	18,,550	48,388	314,222	15,708	... .	.....
30. Harlem Extension South§	1880	58	60.2	3	2	.....	1	.....	.....	.....	.....	.....	25,9c0	39,440	.....
	1879	58	6 .2	2	2	.....	1	.....	.....	.....	.....	.....	35,960	35,96	.....
31. Chateaugay	1880	34.3	36.8	6	2	2	.....	121	75,000	106,000	40 572	215.572	.....	43,820	.....
	1879	17.3	19.7	3	4	.....	.....	21	75,000	.....	11,465	83 465	.....	5,839	.....
32. Lake Ontario Southern‖	1880	37.6	.....	3	3	.....	1	37	940.475	994,300	54,874	2,0 1,9:2	.....	28,045	....
33. Marine	1880	5	.....	3	8	.....	.....	.....	50,000	.....	24,273	62,566	56,500	.....	... .
	1879	5	.. ..	3	8	.....	.....	.....	50,000	.....	.....	56,531	48,550	.....	.....
34. Middleburg & Schoharie	1880	5.8	6.8	1	.....	.....	.....	2	85,000	18,0:0	200	103,(37	10,350	3,450	.. ..
	1879	5.8	6 8	1	.....	.....	.....	2	85,000	18 000	200	105,000	8,293	4,550	... .
35. Middletown & Crawford	1880	10 2	10.7	1	.....	2	.....	3	122,300	79,200	.....	198,273	8,294	10,844	.....
	1879	10.2	10.7	.....	.....	.....	.....	.....	12 ,300	79,300	... .	195,673	8,2.2	9,4 0	.....
36. Newburg, Dutchess & Connecticut*	1880	58.6	67	.....	.....	.....	.....	.....	1,100,000	1,164,500	214,836	2,258.3 2	28,922	85 596	.....
	1879	58.6	67	.....	.....	.....	.....	.....	1,100,000	.....	1 8,923.	2,258,34:	28,842	83,861	.....
37. New York & Brighton Beach**	1880	2.7	5.7	.....	.....	.....	.....	.....	90,000	142,000	9 2,909	309,280	.....	.....	.....
38. New York & Manhattan Beach	1880	22.9	37.9	12	2	75	2	47	651.200	836,800	10,004	446,598	191,447	26,5 1	.. ..
	1879	2 .9	37.9	.....	2	75	2	47	500,000	975,200	15,000	397 918	158.70	5,524	.....
39. New York, New Haven & Hartford	1880	123.2	412	97	204	.....	60	1,687	15,50 ,000	.....	331.431	15,733.002	1,44 ,698	949,803	.....
	1879	123.2	412	94	202	.....	6	1,478	15,500,000	.....	25 ,717	15,733,002	1,:86,904	844,7 6	59,571
40. New York, Pennsylvania & Ohio††	1880	512	735	193	48	48	41	4,529	.....	87,500,000	670,725	.....	913,331	2,797,564	.....
41. New York & Sea Beach	1880	6	8.5	4	24	.....	.....	10	250,000	411,788	60,264	532,587	.....	.....	.....
	1879	6	8.5	5	24	.....	2	8	165,000	200,000	170,000	50 ,:86	12.528	.....	.....
42. Ogdensburg & Lake Champlain	1880	118	136	32	10	3	3	1,141	5 077,000	992,000	29:,69.)	5,677,000	153,193	287,987	.....
	1879	118	1:6	34	10	3	4	952	5,077,000	992,000	209,688	5,677,000	151,453	211,442	.....
43. Olean, Bradford & Warren	1880	22.9	25.9	3	2	2	2	79	150 000	.....	5,777	144,5 8	29,992	7,119	.....
	1879	22.9	25.9	3	2	2	2	118	150,0 0	.....	.....	143,661	21,597	7,140	.....
44. Oswego & Syracuse†	1880	35	51.6	14	8	5	5	316	1,3:0,400	476,000	1,893	1,770,129	116,600	197,140	.....
	1879	35	51.6	14	8	5	5	304	1,320,400	461,500	82,909	1,765,379	128,145	176,300	.....
45. Port Jervis & Monticello	1880	23.8	24.7	2	2	.....	1	8	724,277	16,000	.....	1,128,6 6	25,521	3,000	.....
	1879	2 .8	24.7	2	2	.....	.....	7	724,277	16,000	.....	1,126,218	24,030	.....	.....
46. Poughkeepsie, Hartford & Boston	1880	47.5	49.4	4	2	1	2	60	850,000	535,000	83,266	1,499,920	30,600	29,186	.. ..
	1879	47.5	49.4	4	2	2	.....	60	850,000	535,000	38,216	1,499,920	31,322	30,080	.....
47. Rhinebeck & Connecticut	1880	41.6	.....	5	1	2	1	81	67 ,:30	800,000	199,5	1,440,854	54,616	.....	.....
	1879	41.6	.....	5	1	2	1	180	614,5 0	800,000	78,526	1,440,920	57.184	.....	.....
48. Rochester & Lake Ontario	1880	6	6.5	2	8	.....	.....	2	64,559	.....	167	77,499	17,182	.....	.....
	1879	5.9	6.4	2	6	.....	.....	2	49,985	.....	3,000	54,526	6.574	.....	.....
49. Rochester & State Line	1880	107.6	118.3	11	9	1	5	253	22,094	2,160,000	91,2 8	2,452,108	170,526	192,328	.....
	1879	107.6	118.3	11	9	1	5	246	22,094	2,175,600	111,709	2,437,416	135,740	264,825	.....
50. Rome & Clinton†	1880	12.7	13.8	1	.....	.....	.....	.....	345,360	.....	300	360,05.	14,068	10,997	.....
	1879	12.7	13.8	.....	.....	.....	.....	.....	345,360	.....	1,500	360,000	10,407	9,650	.....
51. Rome, Watertown & Ogdensburg	1880	408.9	463 3	51	30	22	23	1,153	5,293,900	8,622,500	438,078	11,315,878	667,614	515,639	.....
	1879	408.9	463.8	52	37	13	25	1,191	5,29 ,900	7,759,900	597,779	11,315,878	661,:80	417,633	.....
52. Rensselaer & Saratoga	1880	182.8	253.9	58	68	15	25	1 721	6,854,100	2,000,000	.....	6,798,921	495,623	369 ,97	.....
	1879	182.6	253.9	54	67	13	25	1,725	6,854,100	2,000,000	.....	6,798,921	462,820	268,789	.....
53. Scoharie Valley	1880	4 4	4.9	1	1	.....	1	.....	100,000	40.000	.....	10 ,793	.....	10,500	.....
	1879	4.4	4 9	1	1	.....	1	.....	100.000	34,500	.....	103,113	.....	10,500	.....
54. Silver Lake	1880	6.5	7.2	1	1	.....	1	1	120,127	15.000	.....	138,689	10,800	10,800	.....
	1879	6.5	7.2	2	1	1	1	1	120,127	15,000	.....	138,689	.. ..	10,000	.....
55. Skaneateles	1880	5	5.9	2	1	1	1	1	77,800	38,000	.....	185,930	.....	12 480	.....
	1879	5	5.9	2	1	1	1	2	77,800	40,000	.....	183,232	.....	12,750	.....
56. Southern Central	1880	114	131.8	16	7	2	5	433	1,790,235	2,717,050	88,992	4,290,880	226,220	207,166	.....
	1879	114	131.8	16	7	2	5	407	1,790,235	2,658,325	82,815	4,294,068	190,214	232,497	.....
57. Syracuse, Binghamton & New York†	1880	81	138	19	8	2	2	539	2,004,000	2,020, 00	148,291	3 45,130	183,158	3 9,592	.....
	1879	81	138	17	8	4	4	435	2,004,000	2,022,775	124,473	4,151,39	171,491	270,146	.....

Name of Road.	Year.	Number of passengers.	Passenger miles	Tons carried	Ton-miles	Gross Earnings. Passenger	Freight	Other	Total	Working Expenses. Maintenance of road	Maintenance of equipment	Operating	Total	Net earn.	Interest	Rentals	Dividends
27.	1880	140,541	2,668,287	469,3 2	14.707,396	$ 69,354	$ 219,365	$ 9.745	$ 318,464	$ 188,461	$ 44,365	$ 167,939	$ 400,826	$ Deficit.	$ 48,639	$	$ .....
	1879	101,243	1,872,612	514,753	28,076,122	53,914	240,336	8,324	302,573	181,156	59,305	187,539	427,999	Deficit.	47,424	.....	.....
28.	1880	38,647	275,132	237,448	1,898,772	10,433	32,870	3,176	46,589	8,198	2,125	14,263	:4,586	21,994	12,000	.....	14,000
	1879	34,627	246,949	289,378	2,311,399	9,809	29,457	3,176	42,443	7 220	1,557	15,108	23,886	18,557	12,000	.....	14,000
29.	1880	12,520	15,100	21,739	257,580	10,748	18,236	1,728	30,712	9,259	5,114	7,987	22,360	8,352	350	.....	....
	1879	13,974	139,740	8,583	85,869	7,400	11,550	1,464	20,415	4,111	290	6,089	10,489	9,925	194	.....	....
30.	1880	32,379	1,393,017	49,100	1,934,000	13,930	50,869	3,545	68,343	24,193	2,116	43,318	69,627	Deficit.	.....	.....	.....
	1879	29,818	551,910	40,200	1,608,000	10,96)	44 803	3,512	59,284	20,158	3,170	34,470	57, 98	1,486	.....	.....	.....
31.	1880	13,951	203,605	56,861	1,630,154	9,224	45,66(	2,451	57,362	10,146	4,578	21,543	36,267	21,094	.....	.....	.....
	1879	2,072	28,070	1,828	25,095	1,232	1,861	183	3,336	2,788	1,283	2,797	6,870	Deficit.	.....	.....	.....
32.	1880	47,216	234,408	33,034	913,316	5,903	13,781	2,331	22,016	7,024	1,575	13,943	22,541	Deficit.	615	.....	....
33.	1880	844,472	42 ,547	.....	.....	42,239	.....	.....	42,239	594	.....	25,468	26,063	16,176	.....	.....	.....
	1879	725 633	361,371	.....	.....	36,2 9	.....	.....	36,219	553	352	10,266	11,170	25,049	.....	4,70.	12,500
34.	1880	9,513	54,699	5,400	31,050	2,855	3,263	521	6,639	1,374	351	3,456	5,182	1,457	1,170	....	.....
	1879	7,960	47,534	4,330	25,180	2,488	2,729	490	5,707	1,824	249	2,506	4,578	1,129	1,26)	.....	.....
35.	1880	12,514	128,713	9,471	110,085	3,861	17,067	1,149	22,077	3,318	840	11,842	16,02.	6,048	5,537	.....	511
	1879	14,850	123,751	9,332	81,655	3 694	17,163	690	21,547	3,303	172	11,788	15,265	6,282	5,586	.....	3,051
36.	1880	67,077	743,503	147,189	3,297.490	18,531	127,865	31,482	177,879	57,351	16,361	83,431	160,146	17,732	14.145	.....	.....
	1879	59,392	662,388	112,780	2,852,622	16,455	113,52)	34,565	164,489	47,799	14,220	83 924	145,943	18,546	7,304	.....	.....
37.	1880	.....	.....	.....	.....	20,208	90	850	21,148	.....	.....	25,798	25,7 8	Deficit.	.....	.....	.....
38.	1880	1,227 597	12,582,869	24,307	219,157	221.741	33,051	.....	324,792	9,112	14,603	181,194	204,913	119,879	82,5 1	35,000	5,292
	1879	1,062,985	1 ,848,952	12,073	106,926	259,284	17,218	19,958	296,464	2,029	10,321	184,635	176,955	119,509	70,172	35,000	80,000
39.	1880	4,600,507	125,300,345	1,348,687	78,372,836	2,337,50)	1,851,169	305,500	4,294,236	538,828	420,985	1,639,437	2,593,250	1,694,986	130,000	.....	1,550,000
	1879	3,587,899	103,113,445	1,239,630	64,187,479	2,150,592	1,492,261	290,782	3,933,595	443,79)	373,573	1,419,561	2,241,935	1,691,660	130,000	.....	1,550,000
40.	1880	958,049	40,339,232	2,858,606	321,731,076	824,481	2,791,062	142,190	3,757,733	694,227	553,921	1,523,744	2,777 892	980 840	280,000	.....	244,136
41.	1880	389,000	.....	.....	.....	29 407	530	843	30,783	638	363	24,045	25,076	5 709	14,83.	.....	.....
	1879	134,162	.....	.....	.....	22,585	1,423	2,767	26,774	4 924	1,515	21,622	28,061	Deficit.	.....	.....	.....
42.	1880	106,539	3,769,840	309,538	28,017,790	106,231	371,313	81,222	558,816	98,472	101,786	187,633	387,890	170,917	.....	.....	.....
	1879	104,982	3,645,811	245,636	22,43),40.	91,644	306,650	71,80)	472,172	136,841	65,154	168,807	370,782	101,390	71,655	.....	.....
43.	1880	152,300	761,752	23,615	257,647	48,596	33,213	8,285	93,094	10 543	11,250	20,083	41,876	51,218	.....	.....	36,000
	1879	145,688	1,005,015	18,672	231,052	41,69)	30,717	3,685	76,092	9,578	2..750	39,113	33,979	.....	.....	.....	31,000
44.	1880	145,531	2,678,770	433,436	11,556,274	86,157	267,93)	33,274	387,364	6),742	39,257	100,508	200,508	186,856	35,63)	.....	118,836
	1879	133,650	2,256,379	450,743	15,757,84)	79,211	234,192	34,047	347,489	78,836	31,667	116,219	226,722	120,767	32,305	.. ..	118,836
45.	1880	24,127	388,395	17,367	380,406	11,258	15,375	2,495	29,128	10.014	2,747	9,921	22,681	6,545	1,120	.....	.....
	1879	19,211	304,771	13,782	269,476	9,44)	14,267	2,099	25,807	10,107	1,277	12,807	24,191	1,617	.....	.....	.....
46.	1880	57,725	8 5,875	23,623	661,444	21,07)	24,967	10,061	56,101	14,3.1	7.773	27,879	50,01.	6,088	3,870	9,005	.....
	1879	45,000	670,000	20,232	560,000	19,804	21,806	10,234	51,845	13,402	6 199	24,757	43,320	8,516	183	8,00)	.....
47.	1880	13,488	159,341	73,089	2,622,851	4,827	49,461	11,501	65,789	22,314	5,722	31,851	59,887	5 902	57,027	7,967	.....
	1879	13,415	177,461	76,590	2,991,655	4,876	57,211	7,204	69,291	22,475	4,652	32,092	59,1.0	10,131	794	8,000	.....
48.	1880	130,747	76 ,725	.....	.....	20,636	.....	63)	21,276	1,12.	683	7,017	8,820	12,456	.....	.....	.....
	1879	52,369	263,720	.....	.....	7,878	.....	.....	7,878	819	4 3	2,793	3,657	4,220	.....	.....	.....
49.	1880	128,848	3,300,399	282,792	26,341,467	83,080	161,63)	11,117	255,832	49,084	26,309	145,745	221,13.	34,693	.....	.....	.....
	1879	104,098	2,300,959	325,210	30,998,849	61,33)	198,03.	16,535	275,898	62,590	23,932	152,563	263,085	39,813	17,934	.....	.....
50.	1880	26,780	210,459	48,949	538,957	11,245	21,67.	2,226	35,143	8,736	1,003	12,467	22,21.	12,93.	.....	25,500	.....
	1879	23,905	198 140	28,682	320,992	10,204	13,621	2,372	26,198	8,45)	731	11,764	20,940	5,257	.....	25,000	....
51.	1880	588,323	16,422,043	587,38	43,538,148	433,497	884,087	149,410	1,467,895	361,2 3	170,587	445,347	983,156	487,738	260,535	24,000	.....
	1879	514 770	20,517,456	371,083	25,914,493	382,691	647,357	113,331	1,143,289	264,927	119,461	452 247	834,640	3 8,648	250,848	24,000	.....
52.	1880	1,400,451	21,737,913	1,060,781	54,333,707	634,923	1,078,68.	106,713	1,821,318	255,23.	149,683	554,03.	958,946	895,372	.....	770,100	.....
	1879	1,121,558	19,536,543	765,631	38,839,90)	625,504	814,85)	46,122	1,486,457	351,93)	101,102	594,719	1,107,177	379,279	.....	770,485	.....
53.	1880	23,500	142,500	11,780	58,980	4,325	7,187	1,484	12,997	2,0 2	103	3,393	5,551	7,446	2,400	.....	3,500
	1879	27,000	135,000	11,400	56,500	4,520	8,063	1,417	14,000	3,010	358	3,333	6,70.	7,290	2,415	.....	4,750
54.	1880	19,400	126,10.	11,711	76,121	4,574	7,462	976	13,013	4,0 7	4,420	3,847	12,275	738	1,021	.....	.....
	1879	18,740	93,700	8,815	53,010	3,963	5,948	924	10,838	4,008	25	3,325	7,358	3,480	770	.....	.....
55.	1880	24,410	97,640	23,742	94,968	6,387	10,171	6,904	23,462	5,484	396	8,112	13,991	9,471	2,699	.....	773
	1879	20,400	81,960	18,740	74,960	5,5 3	9,945	1,423	16,872	4,00.	701	9,621	14,419	2,453	2,22.	.....	.....
56.	1880	151,291	2,774,233	411,447	34,917,848	78,887	314,647	62,043	455,567	101,121	38,936	163,273	306,330	149,247	133,955	.....	.....
	1879	128,113	2,145,342	418,84.	35,692,867	67,786	292,413	55,714	19,943	104,551	42,98.	170,131	317,670	102,273	93,921	.....	.....
57.	1880	185,396	4,392,329	1,625,640	117,981,153	126,489	686,23.	56,445	69,157	198,754	116,420	231,646	546,819	3 2,3 7	141,4.0	....	50,100
	1879	148,946	3,7 5,634	1,097,225	83,495,924	113,904	797,899	50,75)	62,564	123,982	86,055	219,685	429,422	333,142	141,400	.....	100,200

* Owned by Lehigh Valley Company. †Worked by Delaware, Lackawanna & Western. ‡ This company was reorganized, the former bonded debt being exchanged for preferred stock. § Now under foreclosure proceedings. ‖ Consolidation of Ontario Southern and Geneva, Hornellsville & Pine Creek companies; reorganization not completed. ¶ Also first-mortgage bonds for $150,000, not issued, but hypothecated. ** Opened for business Aug. 5, 1880. †† Reorganization not completed.

The seven collieries of the company averaged 174 days work each during the year. The average daily product was the largest in the history of the company. Extensive improvements have been made at several of the collieries and breakers. There was expended on coal improvement account $79,916.90; charged off the same account for depreciation, $58,867.54, besides the usual sinking fund of 10 cents per ton of coal mined, amounting to $55,317. The mines are in a promising condition to yield well for many years to come. The report says, in conclusion:

"The second installment of our extended debenture loan matured on Dec. 10, and was promptly paid. The amount outstanding is now $212,381.51, maturing one-half each in 1881 and 1882.

"The floating debt, less cash assets, was about $800,000 at the close of the year. This includes the cost of Delaware Division bonds purchased during the past year by agreement with that company, and of which we now hold $306,000, bearing 6 per cent. interest. The company also owns $740,000 of its 7 per cent. consolidated bonds, and 18,900 shares of its own stock."